Annex M
(normative)
Specified instances of application objects

This annex specifies instances of application objects that are defined within clause 4.2 of this part of ISO 10303.

Each specified instance records the existance of a unique concept that has a specific engineering meaning. This meaning is completely defined in this annex, and shall not be clarified or redefined by a user of this part of ISO 10303.

NOTES

1 – The Class_of_facility Safety_valve (see annex M, instance 463) is defined in this annex. In an exchange file, the specified instance may be associated with descriptive text, but this text does not change the meaning of the instance.

2 – Each application object may have instances that are not specified within this annex, but are instead defined by a user of application protocol.

3 – A specified instance of a Class_of_facility (say) may be specialised by:

a) creating a user defined instance of Class_of_facility; and

b) recording that the user defined class is a specialisation of the specified class by an instance of Classification_of_class_of_facility (see 4.2.36).

The specified instances are defined in tables within this annex.

NOTES

4 – The tables of specified instances are grouped according to application object.

5 – A listing of the standard data in digital form is provided by annex N.

The meaning of the columns in the tables of specified instances is defined as follows:

– The tables of specified instances of classes and the tables of specified enumerated Properties have columns as follows:

inst.: This is an identifier for the standard instance, and is used for cross-referencing within this part of ISO 10303. The standard instances are numbered in sequence within this annex, irrespective of table.

name: This is a unique keyword for the instance. This keyword is specified with upper and lower case characters as shown, and without leading, trailing or embedded blanks as a STRING attribute of an entity within the AIM schema.

NOTE 6 – The AIM schema is defined in clause 5.2. For each entity that may record a standard instance in this annex, clause 5.2 specifies the attribute that contains the keyword.

definition: This is the normative definition of the specified instance.

Specified instances are defined by tables with these columns for the following application objects:

- Class_of_activity;
- Class_of_annotation_element;
- Class_of_facility;
- Class_of_information_content;
- Class_of_involvement;
- Class_of_material;
- Class_of_property;
- Class_of_substance;
- Property.

– The tables of specified instances of associations have columns as follows:

inst.: This is an identifier for the standard instance, and is used for cross-referencing within this part of ISO 10303. The standard instances are numbered in sequence within this annex, irrespective of table.

first attribute: This column contains the name indicating one of the specified instances that are associated.

The column heading is an attribute name for the association, as specified in clause 4.2.

second attribute: This column contains the name indicating the other specified instance that is associated.

The column heading is the other attribute name for the association, as specified in clause 4.2.

NOTE 7 – A specified instance of an association is always between two other specified instances.

Specified instances are defined by tables with these columns for the following application objects:

- Recognized_involvement_for_activity_according_to_class;

- Classification_of_class_of_facility;
- Classification_of_class_of_material.

The specified instances of associations between other specified instances, exist whether or not they are explicitly recorded by instances of AIM entities defined in clause 5.2. No meaning shall be deduced from the fact that a specified instance of an association is recorded or not.

NOTE 8 – A specified instance of Classification_of_classof_facility records that a Safety_valve (see annex M, instance 463) is a special sort of Valve_system (see annex M, instance 466).

This information is known to both parties in an exchange according to this part of ISO 10303, whether or not it is recorded by an instance of an AIM entity.

The definitions of the standard instances shall be interpreted as follows:

– Each specified instance of a class is defined by text that describes the nature of a member of the specified instance of class.

EXAMPLE 260 – Electric_power_station is a specified instance of Class_of_facility.

The definition of Electric_power_station is:
"A Facility (see 4.2.89) that generates electric power for transmission or distribution".

– Each definition of a specified instance of a class shall be interpreted as if the text were preceded by:
"A class such that each member is".

EXAMPLE 261 – The definition in example 260 could be written more precisely as:
"A class such that each member is a Facility that generates electric power for transmission or distribution".

– Text that describes the nature of a member of a specified instance of class may reference a class of broader scope. Such definitions have the form:
"A <specified instance of class of broader scope> that ....".

– Each definition of a specified instance of a class, that references a specified instance of class of broader scope, shall be interpreted as if it were:
"A class such that each member is a also classified as a <specified instance of class of broader scope>, and such that each member ....".

EXAMPLE 262 – Fire_detection_system is a specified instance of Class_of_facility. Safety_system is another specified instance of Class_of_facility of broader scope, i.e. a Fire_detection_system is a subclass of Safety_system.

The definition of Fire_detection_system is:
"A Safety_system (see annex M, instance 346) that detects the existence of a fire".

This definition could be written more precisely as:
"A class such that each member is also classified as a Safety_system and such that each member detects the existence of a fire".

M.1 Specified instances of Class_of_activity

The specified instances of Class_of_activity (see 4.2.24) are defined in the tables in clause M.1.

NOTE – Each instance of the AIM entity **standard_class_of_activity** (see 5.2.3.153) has a **name** attribute inherited from **group**.

This attribute is one of the keywords listed in the 'name' column of the tables in clause M.1 and indicates the corresponding specified instance of Class_of_activity.

M.1.1 Specified instances of Class_of_activity for Design

Specified instances of Class_of_activities relevant to Design (see annex M, instance 2) are defined in table M.1.

The Activities of the classes defined here are carried out by people during the design of a process plant.

Table M.1 – Specified instances of Class_of_activity for Design

inst.	name	definition
1	**Assess**	An Activity (see 4.2.7) that assesses whether or not an application object is fit for a purpose, and that creates an Approval_of_object (see 4.2.16).
2	**Design**	An Activity (see 4.2.7) that creates an Intended_object (see 4.2.101) or a Typical_object (see 4.2.178) or information about an Intended_object or Typical_object.
NOTE – A Design Activity may be recorded as the cause of a Beginning_or_end_effect (see 4.2.21) for an Intended_object or for a typical object.		

M.1.2 Specified instances of Class_of_activity for processes

Specified instances of Class_of_activity relevant to processes are defined in table M.2.

The Activities of the classes defined here are carried out by Facilities and Material objects during the operation of a process plant.

Table M.2 – Specified instances of Class_of_activity for processes

inst.	name	definition
3	**Transfer_material**	An Activity (see 4.2.7) that moves Material (see 4.2.110) from from one place to another.
4	**Transform_material**	An Activity (see 4.2.7) that creates, changes or destroys Material (see 4.2.110).
NOTE – An activity that both transfers and transforms material may be classified as both Transfer_material and Transform_material.		

M.2 Specified instances of Class_of_annotation_element

The specified instances of Class_of_annotation_element (see 4.2.25) are defined in table M.3.

NOTE – Each instance of the AIM entity **standard_class_of_annotation_element** (see 5.2.3.154) has a **name** attribute inherited from **group**.

This attribute is one of the keywords listed in the 'name' column of the table in clause M.2 and indicates the corresponding specified instance of Class_of_annotation_element.

Table M.3 – Specified instances of Class_of_annotation_element

inst.	name	definition
5	**Centre_justified**	An Annotation_text (see 4.2.14) that has rows with relative horizontal positions giving a visual vertical centre line. The y coordinate axis for the Annotation_text is upwards along the centre line, when viewed with characters upright.
6	**Draughting_callout**	An Annotation_element (see 4.2.12) that presents textual information.
NOTE – A Draughting_callout often has a tabular form.		
7	**Hatching_template**	An Annotation_curve (see 4.2.11) that is a reference concept without a centre line curve used as the source in a Hatching_derivation_for_annotation_element (see 4.2.91).
8	**Layer**	An Annotation_element (see 4.2.12) that is intended to be viewed as a whole without any parts excluded.
NOTE – A Layer is often defined to enable a person to select coherent groups of Annotation_elements for display. The Annotation_element that are part of a Layer may represent objects that have something in common, such as Facilities that are parts of the same system.		
9	**Leader**	An Annotation_element (see 4.2.12) that is either an Annotation_curve (see 4.2.11), or an assembly of an Annotation_curve and an Annotation_point (see 4.2.13), and that is interpreted by a person as associating a Draughting_callout (see annex M, instance 6) with another Annotation_element.
10	**Left_justified**	An Annotation_text (see 4.2.14) that has rows with relative horizontal positions giving a visual vertical line to the left. The y coordinate axis for the Annotation_text is upwards along the line to the left, when viewed with the characters upright.

Table M.3 – Specified instances of Class_of_annotation_element (concluded)

inst.	name	definition
11	**Line_font**	An Annotation_curve (see 4.2.11) that is a reference concept without a centre line, but with a Line_pattern (see 4.2.106) and width.
12	**Overlined_text**	An Annotation_text (see 4.2.14) that has a continuous line above the characters.
13	**Right_justified**	An Annotation_text (see 4.2.14) that has rows with relative horizontal positions giving a visual vertical line to the right. The y coordinate axis for the Annotation_text is upwards along the line to the right, when viewed with the characters upright.
14	**Text_font**	An Annotation_element (see 4.2.12) that is a collection of reference Annotation_elements each having the shape of a different character, and forming a complete set of possible characters.
15	**Tiling_template**	An Annotation_element (see 4.2.12) that is a reference concept used as the source in a Tiling_derivation_for_annotation_element (see 4.2.174).
16	**Underlined_text**	An Annotation_text (see 4.2.14) that has a continuous line under the characters.

M.3 Specified instances of Class_of_facility

The specified instances of Class_of_facility (see 4.2.26) are defined in the tables in clause M.3.

NOTES

1 – Each instance of the AIM entity **standard_class_of_facility** (see 5.2.3.155) has a **name** attribute inherited from **group**.

This attribute is one of the keywords listed in the 'name' column of the tables in clause M.3 and indicates the corresponding specified instance of Class_of_facility.

2 – The specified instances of Class_of_facility are grouped into tables according to engineering discipline.

Within clause M.3 if a specified instance of Class_of_facility is defined by text that describes an Activity (see 4.2.7), then a member of that Class_of_facility is a capability to perform the described Activity.

NOTE 3 – Many standard instances of Class_of_facility are defined as a capability to perform an Activity.

EXAMPLE 263 – Electric_power_station is a specified instance of Class_of_facility.

The definition of Electric_power_station is:
"A Facility (see 4.2.89) that generates electric power for transmission or distribution".

"Generate electric power for transmission or distribution" is an Activity.

A description of an Activity that is used to define a specified instance of Class_of_facility shall be interpreted as if the verb were preceded by the text "is meant to".

NOTE 4 – An Electric_power_station is still an Electric_power_station when it is on stand-by or even when it is shut down for maintenance.

EXAMPLE 264 – The definition in example 263 could be written more precisely as:
"A Facility (see 4.2.89) that is meant to generate electric power for transmission or distribution".

Or even more precisely as:
"A class such that each member is a Facility that is meant to generate electric power for transmission or distribution".

M.3.1 Specified instances of Class_of_facility for a Connector_of_facility

Specified instances of Class_of_facility for a Connector_of_facility (see 4.2.68) are defined in table M.4.

Table M.4 – Specified instances of Class_of_facility for Connector_of_facility

inst.	name	definition
17	**Catalyst_drop_out_nozzle**	An Outlet (see annex M, instance 27) that removes catalyst from a Vessel (see annex M, instance 1113).
18	**Connector_of_facility**	A Facility that enables a flow of energy, load, process material or signal to or from another Facility.
NOTE – A Connector_of_facility is also an Application Object (see 4.2.68).		
19	**Discharge_port**	An Outlet (see annex M, instance 27) that is of a Pump_system (see annex M, instance 420) and that enables the connection of Discharge_piping (see annex M, instance 390).
20	**Drain_nozzle**	A Fluid_port (see annex M, instance 24) that is connected to a Drain (see annex M, instance 479).
21	**Electrical_energy_port**	An Energy_port (see annex M, instance 23) and an Electrical_port (see annex M, instance 22) that enables a flow of electrical energy.
22	**Electrical_port**	A Connector_of_facility (see annex M, instance 18) that enables a flow of electric current.
NOTE – The flow of electric current may be intended to transmit energy or signal.		
23	**Energy_port**	A Connector_of_facility (see annex M, instance 18) that enables a flow of energy.
24	**Fluid_port**	A Material_port (see annex M, instance 26) that enables a flow of fluid.
25	**Inlet**	A Material_port (see annex M, instance 26) that enables flow into a Facility.
26	**Material_port**	A Connector_of_facility (see annex M, instance 18) that enables a flow of Material (see 4.2.110).

Table M.4 – Specified instances of Class_of_facility for Connector_of_facility (concluded)

inst.	name	definition
27	**Outlet**	A Material_port (see annex M, instance 26) that enables flow out of a Facility.
NOTE – The Material that provides the service may be an assembly of a Nozzle (see annex M, instance 569) and a Vortex_breaker (see annex M, instance 1206).		
28	**Process_nozzle**	A Fluid_port (see annex M, instance 24) that enables a flow of Process_material (see 4.2.136).
29	**Signal_port**	A Connector_of_facility (see annex M, instance 18) that enables a flow of information.
30	**Steam_out_nozzle**	A Fluid_port (see annex M, instance 24) that is used for the cleaning of a system by the use of steam.
31	**Suction_port**	An Inlet (see annex M, instance 25) that is of a Pump_system (see annex M, instance 420) and that enables the connection of Suction_piping (see annex M, instance 433).
32	**Vent_nozzle**	A Fluid_port (see annex M, instance 24) that is connected to a Vent (see annex M, instance 280).

M.3.2 Specified generic instances of Class_of_facility

Specified instances of Class_of_facility that are not specific to an engineering discipline are defined in table M.5.

Table M.5 – Specified instances of Class_of_facility for generic classification

inst.	name	definition
33	**Facility_assembly**	A Facility (see 4.2.89) that is an assembly of two or more other Facilities.
NOTE – The term 'assembly' is defined in 3.5.2.		
34	**Facility_branch**	A Facility (see 4.2.89) that is a single branch in a network with a connection at each end, and no others.
NOTE – A Facility_branch has the topology of an edge (see ISO 10303-42).		
35	**Facility_catalogue**	A Facility_collection (see annex M, instance 36) that supports the selection of members of the collection.
36	**Facility_collection**	A Facility (see 4.2.89) that is a collection of two or more other Facilities.
NOTE – The term 'collection' is defined in 3.5.5.		
37	**Facility_network**	A Facility_assembly (see annex M, instance 33) that has interconnected members and that may be regarded as a network of Facility_nodes (see annex M, instance 38) connected by Facility_branches (see annex M, instance 34).
38	**Facility_node**	A Facility (see 4.2.89) that is a single node in a network.
NOTE – A Facility_node has the topology of a vertex (see ISO 10303-42).		

M.3.3 Specified instances of Class_of_facility for heat transfer

Specified instances of Class_of_facility relevant to a Heat_transfer_system (see annex M, instance 58) are defined in table M.6.

Table M.6 – Specified instances of Class_of_facility for heat transfer

inst.	name	definition
39	**Air_cooler**	A Cooler (see annex M, instance 45) that uses air as the cooling fluid.
NOTE – The air is heated. This is not the opposite of Air_heater (see annex M, instance 40).		
40	**Air_heater**	A Heater (see annex M, instance 59) that heats air.
41	**Air_preheater**	A Preheater (see annex M, instance 61) that heats air.
42	**Boiler**	A Heat_transfer_system (see annex M, instance 58) that generates hot water, steam or both.
43	**Chiller**	A Cooler (see annex M, instance 45) that does not cool below 4 degrees Celsius.
44	**Condenser**	A Cooler (see annex M, instance 45) that converts a fluid from vapour to liquid phase.
45	**Cooler**	A Heat_exchanger (see annex M, instance 57) that reduces the temperature of a Process_material (see 4.2.136).
46	**Cooling_tower**	An Air_cooler (see annex M, instance 39) that operates by natural draft and that cools water after circulation through a Condenser (see annex M, instance 44).
NOTE – A Cooling_tower may be made of wood, concrete or other things.		
47	**Crystalliser**	A Separator (see annex M, instance 502) that crystallises and separates the formed crystals from a mother liquid or a solvent.

Table M.6 – Specified instances of Class_of_facility for heat transfer (continued)

inst.	name	definition
48	**Desuperheater**	A Heat_exchanger (see annex M, instance 57) that cools a vapour to its dewpoint.
NOTE – A Desuperheater may or may not have a surface separating the cooling vapour from the cooled vapour.		
49	**Drier**	A Heat_transfer_system (see annex M, instance 58) that removes liquid below saturation.
50	**Electric_heater**	A Heater (see annex M, instance 59) that uses electrical energy as the heating mechanism.
51	**Evaporator**	A Heat_transfer_system (see annex M, instance 58) that evaporates moisture or solvent to obtain a required concentration.
52	**Fired_heat_transfer_system**	A Heat_transfer_system (see annex M, instance 58) that generates energy of combustion and uses the energy for heating.
53	**Flaker**	A Freezer (see annex M, instance 55) that also breaks the resulting solid.
54	**Freeze_condenser**	A Condenser (see annex M, instance 44) and a Crystalliser (see annex M, instance 47) that solidifies by reduction of temperature in order to remove the formed solids.
55	**Freezer**	A Cooler (see annex M, instance 45) that solidifies a fluid or maintain a solid state.
56	**Furnace**	A Fired_heat_transfer_system (see annex M, instance 52) that uses heat to induce a reaction in a Process_material (see 4.2.136).
57	**Heat_exchanger**	An Unfired_heat_transfer_system (see annex M, instance 68) that exchanges heat between two fluids.
58	**Heat_transfer_system**	A Facility (see 4.2.89) that transfers heat.
59	**Heater**	A Heat_transfer_system (see annex M, instance 58) that heats a Process_material (see 4.2.136).
60	**Hot_oil_furnace**	A Furnace (see annex M, instance 56) that applies heat through contact with hot oil.
61	**Preheater**	A Heater (see annex M, instance 59) that heats a Process_material (see 4.2.136) before a major process.

Table M.6 – Specified instances of Class_of_facility for heat transfer (concluded)

inst.	name	definition
62	**Reboiler**	A Heat_transfer_system (see annex M, instance 58) that partially vaporises a liquid.
NOTE – A Reboiler service is usually provided by a Shell_and_tube_heat_exchanger (see annex M, instance 577).		
63	**Scraped_heat_exchanger**	A Heat_exchanger (see annex M, instance 57) that removes solids on its surface mechanically.
64	**Steam_desuperheater**	A Desuperheater (see annex M, instance 48) that cools steam to its dewpoint.
65	**Steam_generator**	A Boiler (see annex M, instance 42) that generates steam.
66	**Sulphur_condenser**	A Condenser (see annex M, instance 44) that condenses sulphur.
NOTE – A Heat_transfer_equipment (see annex M, instance 560) that is designed for use as a Sulphur_condenser has a special construction material (see 3.5.8).		
67	**Superheater**	A Heat_exchanger (see annex M, instance 57) that heats a vapour above its dewpoint.
NOTE – A Superheater may or may not have a surface separating the cooling vapour from the cooled vapour.		
68	**Unfired_heat_transfer_system**	A Heat_transfer_system (see annex M, instance 58) that transfers heat between two media without using combustion energy.
69	**Waste_heat_boiler**	A Boiler (see annex M, instance 42) that recovers waste heat and transfers it into hot water or steam.

M.3.4 Specified instances of Class_of_facility for instrumentation and control

Specified instances of Class_of_facility relevant to instrumentation and control are defined in table M.7.

Table M.7 – Specified instances of Class_of_facility for instrumentation and control

inst.	name	definition
70	**Accelerometer**	A Meter (see annex M, instance 165) that measures acceleration.
71	**Air_lubricator**	A Lubrication_system (see annex M, instance 408) that lubricates Instrument (see annex M, instance 140) air.
72	**Air_supply_system**	A System (see annex M, instance 354) that supplies air.
73	**Alarm_lamp**	A Lamp (see annex M, instance 146) that indicates an alarm to a person.
74	**Alarm_system**	A Safety_system (see annex M, instance 346) that detects an unsafe situation and produces an alarm.
75	**Amplifier**	An Instrument (see annex M, instance 140) that amplifies an electrical signal.
76	**Analyser**	A Facility (see 4.2.89) that analyses a substance to determine either its composition, or its properties or both.
77	**Audible_device**	A Control_system_component (see annex M, instance 89) that is audible when it is activated.
78	**Automatic_detector**	A Detector (see annex M, instance 93) that operates automatically in response to a measurement.
79	**Automatic_switch**	A Switch (see annex M, instance 221) that operates automatically in response to a signal.
80	**Batch_controller**	A Controller (see annex M, instance 90) that is used for a batch process.
81	**Boiling_point_analyser**	An Analyser (see annex M, instance 76) that determines the boiling point or boiling range of a liquid.

Table M.7 – Specified instances of Class_of_facility for instrumentation and control (continued)

inst.	name	definition
82	**Carbon_dioxide_analyser**	An Analyser (see annex M, instance 76) that determines the concentration of carbon dioxides.
83	**Cloud_point_analyser**	An Analyser (see annex M, instance 76) that determines the cloud point of a vapour.
84	**Communications_-controller**	A Controller (see annex M, instance 90) that acts as a node in a communications network.
85	**Computing_relay**	A Relay (see annex M, instance 203) that carries out a calculation.
86	**Conductivity_meter**	A Meter (see annex M, instance 165) that measures electrical conductivity.
87	**Control_loop**	A Loop (see annex M, instance 158) that is part of a Control_-system (see annex M, instance 88).
88	**Control_system**	A Control_and_monitoring_system (see annex M, instance 288) that controls an Activity (see 4.2.7).
89	**Control_system_-component**	A Facility (see 4.2.89) that is part of a Control_system (see annex M, instance 88).
90	**Controller**	A Control_system_component (see annex M, instance 89) that converts one or more input signals into one or more output signals according to an algorithm.
91	**Current_meter**	A Meter (see annex M, instance 165) that measures electric current.
92	**Density_analyser**	An Analyser (see annex M, instance 76) that determines the density of a substance.
93	**Detector**	A Sensor (see annex M, instance 211) that detects a change of state only, and that does not make continuous measurements.
94	**Dew_point_analyser**	An Analyser (see annex M, instance 76) that determines the dew point of a substance.
95	**Differential_pressure_-measuring_device**	A Measuring_device (see annex M, instance 163) that measures a differential pressure.
96	**Differential_pressure_-meter**	A Meter (see annex M, instance 165) that measures a differential pressure.

Table M.7 – Specified instances of Class_of_facility for instrumentation and control (continued)

inst.	name	definition
97	**Differential_pressure_-switch**	An Automatic_switch (see annex M, instance 79) that switches at a preset differential pressure.
98	**Differential_pressure_-transmitter**	A Transmitter (see annex M, instance 233) that transmits a signal determined by a measured differential pressure.
99	**Differential_-temperature_measuring_-device**	A Measuring_device (see annex M, instance 163) that measures differential temperature.
100	**Differential_-temperature_switch**	An Automatic_switch (see annex M, instance 79) that switches at a preset differential temperature.
101	**Dip_tube**	A Level_measuring_device (see annex M, instance 150) that is based on a static pressure principle.
102	**Display**	A Facility (see 4.2.89) that presents information to a person.
103	**Distributed_control_-system**	A Control_system (see annex M, instance 88) that has Sensors (see annex M, instance 211) and Final_control_devices (see annex M, instance 113) at different physical locations.
104	**Duration_meter**	A Meter (see annex M, instance 165) that measures a time duration.
NOTE – A time duration may be running hours.		
105	**Electric_pneumatic_-transducer**	A Transducer (see annex M, instance 232) that converts an electrical signal into a pneumatic signal.
106	**Electric_switch**	A Switch (see annex M, instance 221) that switches current within an electric circuit.
107	**Electro_magnetic_meter**	A Meter (see annex M, instance 165) that uses a magnetic field to induces electric currents in a Material upon which a measurement is made.
108	**Event_recorder**	A Recorder (see annex M, instance 198) that records a discrete state changes or a Property change that crosses a threshold level.
109	**Field_instrument**	An Instrument (see annex M, instance 140) that is mounted at the location where its function is required.

Table M.7 – Specified instances of Class_of_facility for instrumentation and control (continued)

inst.	name	definition
110	**Field_push_button**	A Push_button (see annex M, instance 197) that is mounted at the location where its function is required.
111	**Field_selector**	A Selector (see annex M, instance 210) that s mounted at the location where its function is required.
112	**Final_boiling_point_-analyser**	A Boiling_point_analyser (see annex M, instance 81) that determines the final boiling point of a mixture.
113	**Final_control_device**	A Control_system_component (see annex M, instance 89) that influences a controlled item or substance directly.
114	**Fire_detector**	An Automatic_detector (see annex M, instance 78) that detects the presence of unwanted fire.
115	**Fire_or_gas_detector**	An Automatic_detector (see annex M, instance 78) that detects the presence of unwanted fire or gas.
116	**Flame_detector**	An Automatic_detector (see annex M, instance 78) that detects the presence of a flame in a furnace.
117	**Flash_point_analyser**	An Analyser (see annex M, instance 76) that determines the flashpoint of a substance.
118	**Flow_controller**	A Controller (see annex M, instance 90) that controls a flow rate.
119	**Flow_detector**	An Automatic_detector (see annex M, instance 78) that detects whether a fluid flow exists.
120	**Flow_gauge**	A Gauge (see annex M, instance 128) that indicates a flow rate.
121	**Flow_measuring_device**	A Measuring_device (see annex M, instance 163) that measures a flow rate.
122	**Flow_meter**	A Meter (see annex M, instance 165) that measures a flow rate.
123	**Flow_transmitter**	A Transmitter (see annex M, instance 233) that transmits a signal determined by a measured flow rate.
124	**Flue_gas_analyser**	An Analyser (see annex M, instance 76) that analyses the chemical composition of a flue gas.

Table M.7 – Specified instances of Class_of_facility for instrumentation and control (continued)

inst.	name	definition
125	**Gas_alarm_system**	An Alarm_system (see annex M, instance 74) and a Gas_detection_system (see annex M, instance 315) that detects the presence of an unwanted gas and produces an alarm.
126	**Gas_density_analyser**	A Density_analyser (see annex M, instance 92) that is for gas.
127	**Gas_detector**	An Automatic_detector (see annex M, instance 78) that detects a gas.
128	**Gauge**	A Measuring_device (see annex M, instance 163) that indicates a measured value to a person but does not produce a signal to represented the measured value.
129	**H2S_SO2_ratio_analyser**	An Analyser (see annex M, instance 76) that determines the ratio between a hydrogen sulfide and a sulphur dioxide concentration.
130	**H2S_analyser**	An Analyser (see annex M, instance 76) that determines the hydrogen sulphide concentration in a fluid.
131	**H2S_in_air_analyser**	A H2S_analyser (see annex M, instance 130) that determines the hydrogen sulphide concentration in air.
132	**Hardness_analyser**	An Analyser (see annex M, instance 76) that determines the hardness of a solid.
133	**HF_in_air_detector**	An Automatic_detector (see annex M, instance 78) that detects the presence of hydrogen fluoride in air.
134	**Humidity_meter**	A Meter (see annex M, instance 165) that measures humidity.
135	**Hydrocarbons_in_H2S_analyser**	An Analyser (see annex M, instance 76) that determines the hydrocarbon concentration in hydrogen sulphide.
136	**Hydrocarbons_in_water_analyser**	An Analyser (see annex M, instance 76) that determines the oil concentration in water.
137	**Hydrocarbons_in_water_detector**	An Automatic_detector (see annex M, instance 78) that detects hydrocarbons in water.
138	**Indicator**	An Instrument (see annex M, instance 140) that displays information obtained by a Sensor (see annex M, instance 211) to a person.

Table M.7 – Specified instances of Class_of_facility for instrumentation and control (continued)

inst.	name	definition
139	**Indicator_controller**	A Controller (see annex M, instance 90) that is also an Indicator (see annex M, instance 138).
140	**Instrument**	A Facility (see 4.2.89) that either detects an aspect of a process; records information about a process; modifies information about a process; displays information about a process; or performs a combination of these activities.
141	**Instrument_air_piping**	A Piping (see annex M, instance 715) that provides air for Instruments (see annex M, instance 140).
142	**Instrument_air_supply_system**	An Air_supply_system (see annex M, instance 72) that supplies air for Instruments (see annex M, instance 140).
143	**Instrument_air_water_dew_point_analyser**	A Dew_point_analyser (see annex M, instance 94) that determines the dew point of water in Instrument (see annex M, instance 140) air.
144	**Instrument_signal_line**	A Signal_line (see annex M, instance 212) that transmits a signal between an Instrument (see annex M, instance 140) and an Instrument readout such as a Gauge (see annex M, instance 128) or Meter (see annex M, instance 165), or and an alarm.
145	**Instrumentation_system**	A Control_and_monitoring_system (see annex M, instance 288) that processes information about a process but does not control it.
146	**Lamp**	A Facility (see 4.2.89) that emits light.
147	**Level_controller**	A Controller (see annex M, instance 90) that controls a fluid level.
148	**Level_gauge**	A Gauge (see annex M, instance 128) that measures a fluid level.
149	**Level_instrument**	A Instrument (see annex M, instance 140) that measures a fluid level; detects a fluid level; records information about a fluid level; displays information about a fluid level; or performs a combination of these activities.
150	**Level_measuring_device**	A Measuring_device (see annex M, instance 163) that measures a fluid level.
151	**Level_meter**	A Meter (see annex M, instance 165) that measures a fluid level.

Table M.7 – Specified instances of Class_of_facility for instrumentation and control (continued)

inst.	name	definition
152	**Level_switch**	An Automatic_switch (see annex M, instance 79) and a Level_instrument (see annex M, instance 149) that switches at a preset fluid level.
153	**Level_transmitter**	A Transmitter (see annex M, instance 233) and a Level_instrument (see annex M, instance 149) that transmits a signal determined by a measured fluid level.
154	**Limit_switch**	An Automatic_switch (see annex M, instance 79) that switches when a preset position is reached.
155	**Liquid_density_analyser**	A Density_analyser (see annex M, instance 92) that is for liquid.
156	**Local_control_loop**	A Control_loop (see annex M, instance 87) that acts directly between a Sensor (see annex M, instance 211) and a Final_control_device (see annex M, instance 113).
157	**Local_indicator**	An Indicator (see annex M, instance 138) that is located close to a Measuring_device (see annex M, instance 163).
158	**Loop**	A Facility_assembly (see annex M, instance 33) that enables the transfer of information within a Control_and_monitoring_system (see annex M, instance 288).
159	**Lubrication_oil_flash_point_analyser**	A Flash_point_analyser (see annex M, instance 117) that is for lubrication oil.
160	**Machine_monitoring_system**	A Control_and_monitoring_system (see annex M, instance 288) that continuously gathers and analyses information about the Activity (see 4.2.7) performed by mechanical Equipment (see annex M, instance 751), or about the condition of the Equipment, or both.
161	**Machine_sensor**	A Sensor (see annex M, instance 211) that senses the properties possessed by a mechanical Equipment item and the Activity that it is performing.
162	**Manual_switch**	A Switch (see annex M, instance 221) that is operated by a person.
163	**Measuring_device**	An Instrument (see annex M, instance 140) and a Control_system_component (see annex M, instance 89) that measures an aspect of a process.

Table M.7 – Specified instances of Class_of_facility for instrumentation and control (continued)

inst.	name	definition
164	**Mercaptan_analyser**	A Sulphur_analyser (see annex M, instance 217) that determines the mercaptan concentration in a fluid.
165	**Meter**	A Measuring_device (see annex M, instance 163) that either indicates a value to a person, or produces a signal corresponding to a value, or both.
166	**Mist_detector**	A Automatic_detector (see annex M, instance 78) that detects a mist.
167	**Moisture_detector**	A Automatic_detector (see annex M, instance 78) that detects moisture.
168	**Multi_point_indicator**	An Indicator (see annex M, instance 138) that indicates more than one value.
169	**Multi_point_recorder**	A Recorder (see annex M, instance 198) that records more than one value.
170	**N2_analyser**	An Analyser (see annex M, instance 76) that determines the nitrogen concentration in a fluid.
171	**NOx_analyser**	An Analyser (see annex M, instance 76) that determines the nitrogen oxide concentration in a fluid.
172	**O2_in_flue_gas_analyser**	A Oxygen_analyser (see annex M, instance 179) that is for flue gas.
173	**O2_in_process_analyser**	A Oxygen_analyser (see annex M, instance 179) that is for Process_material (see 4.2.136).
174	**Octane_number_analyser**	An Analyser (see annex M, instance 76) that determines the octane number of a fuel.
175	**Oil_mist_detector**	A Mist_detector (see annex M, instance 166) that detects an oil mist.
176	**Optical_signal_line**	A Signal_line (see annex M, instance 212) that carries an optical signal.
177	**Oscillation_detector**	A Detector (see annex M, instance 93) that detects oscillations.
178	**Oscillator**	An Instrument (see annex M, instance 140) that generates an oscilating signal.
179	**Oxygen_analyser**	An Analyser (see annex M, instance 76) that determines the oxygen concentration in a fluid.
180	**Ph_meter**	A Meter (see annex M, instance 165) that measures alkalinity and acidity.

Table M.7 – Specified instances of Class_of_facility for instrumentation and control (continued)

inst.	name	definition
181	**Pig_position_detector**	A Position_detector (see annex M, instance 185) that detect the position of a pig in a pipeline.
182	**PNA_meter**	A Meter (see annex M, instance 165) that measures parafinic, naphtenic and aromatic content of a fluid.
183	**Pneumatic_switch**	A Switch (see annex M, instance 221) that is part of a Pneumatic_system (see annex M, instance 184) and that operates on a pneumatic signal.
184	**Pneumatic_system**	A System (see annex M, instance 354) that transmits a signal using a compressed gas.
NOTE – The gas is usually air.		
185	**Position_detector**	An Automatic_detector (see annex M, instance 78) that detect a position.
186	**Position_meter**	A Meter (see annex M, instance 165) that measures position.
187	**Pour_point_analyser**	An Analyser (see annex M, instance 76) that determines the pour point of a liquid.
188	**Pressure_gauge**	A Gauge (see annex M, instance 128) that measures pressure.
189	**Pressure_instrument**	An Instrument (see annex M, instance 140) that measures a pressure; detects a pressure; records information about a pressure; displays information about a pressure; or performs a combination of these activities.
190	**Pressure_measuring_device**	A Measuring_device (see annex M, instance 163) that measures pressure.
191	**Pressure_meter**	A Meter (see annex M, instance 165) that measures pressure.
192	**Pressure_sensor**	A Sensor (see annex M, instance 211) that senses pressure.
193	**Pressure_switch**	An Automatic_switch (see annex M, instance 79) that switches at a preset pressure.
194	**Pressure_transmitter**	A Transmitter (see annex M, instance 233) and a Pressure_instrument (see annex M, instance 189) that transmits a signal determined by a measured pressure.

Table M.7 – Specified instances of Class_of_facility for instrumentation and control (continued)

inst.	name	definition
195	**Process_control_system**	A Control_and_monitoring_system (see annex M, instance 288) that controls a physical process, a chemical process, a biochemical process or a process that is a combination of these.
196	**Programmable_logic_-controller**	A Control_system (see annex M, instance 88) that has a function determined by control logic software.
197	**Push_button**	A Manual_switch (see annex M, instance 162) that switches when a button is pushed and moved.
198	**Recorder**	A Instrument (see annex M, instance 140) that records information.
199	**Recording_controller**	A Controller (see annex M, instance 90) that controls and records.
200	**Refractive_index_-analyser**	An Analyser (see annex M, instance 76) that determines the refractive index of a fluid.
201	**Regulator**	A Instrument (see annex M, instance 140) that regulates a process.
202	**Relative_gas_density_-analyser**	A Gas_density_analyser (see annex M, instance 126) that determines the density of a gas relative to another gas.
203	**Relay**	A Control_system_component (see annex M, instance 89) that performs a logic operation.
204	**Remote_control_loop**	A Control_loop (see annex M, instance 87) that connects a Control_system_component (see annex M, instance 89) that is physically separated from the rest of the Control_system (see annex M, instance 88).
205	**Safe_guarding_loop**	A Loop (see annex M, instance 158) that is part of a Safe_-guarding_system (see annex M, instance 206).
206	**Safe_guarding_system**	A Safety_system (see annex M, instance 346) that takes action in case of an unsafe situation.
207	**Sample_cooler**	A Cooler (see annex M, instance 45) that reduces the temperature of a sample.
208	**Sampler**	A Instrument (see annex M, instance 140) that converts a continuous signal into a sequence of values at discrete times.
209	**Sampling_system**	A System (see annex M, instance 354) that takes Process_-material (see 4.2.136) for analysis.

Table M.7 – Specified instances of Class_of_facility for instrumentation and control (continued)

inst.	name	definition
210	**Selector**	A Manual_switch (see annex M, instance 162) that has more than two possible positions.
211	**Sensor**	A Instrument (see annex M, instance 140) that senses a process condition and produces a signal.
NOTE – A Measuring_device (see annex M, instance 163) makes a measurement, whereas a Sensor may merely detect a threshold level or an event.		
212	**Signal_line**	A Facility (see 4.2.89) that transmits information as a signal within an enclosed conductor.
NOTE – A Signal_line may transmit information by an electrical signal along a conducting wire, by a light signal along and optical fibre, or by a pneumatic signal along a pipe.		
213	**Smoke_detector**	An Automatic_detector (see annex M, instance 78) that detects smoke.
214	**SO2_in_flue_gas_analyser**	A Flue_gas_analyser (see annex M, instance 124) that determines the sulphur dioxide concentration in gas.
215	**Speed_controller**	A Controller (see annex M, instance 90) that controls speed.
216	**Speed_meter**	A Meter (see annex M, instance 165) that measures speed.
217	**Sulphur_analyser**	An Analyser (see annex M, instance 76) that determines the sulphur concentration in a fluid.
218	**Sulphur_in_gas_analyser**	A Sulphur_analyser (see annex M, instance 217) that determines the sulphur concentration in gas.
219	**Sulphur_in_oil_analyser**	A Sulphur_analyser (see annex M, instance 217) that determines the sulphur concentration in oil.
220	**Surveillance_system**	A Facility (see 4.2.89) that enables visual observation of an area.
221	**Switch**	A Detector (see annex M, instance 93) that switches and thus start or changes a process.
222	**Tank_gauge**	A Gauge (see annex M, instance 128) that is mounted on a Tank.
NOTE – A Tank_gauge is usually a Level_gauge (see annex M, instance 148).		
223	**Telemetry_system**	An Instrumentation_system (see annex M, instance 145) that measures a Property (see 4.2.137) from a remote distance.

Table M.7 – Specified instances of Class_of_facility for instrumentation and control (continued)

inst.	name	definition
224	**Temperature_detector**	A Detector (see annex M, instance 93) that detects a preset temperature.
225	**Temperature_instrument**	An Instrument (see annex M, instance 140) that measures a temperature; detects a temperature; records information about a temperature; displays information about a temperature; or performs a combination of these activities.
226	**Temperature_measuring_device**	A Measuring_device (see annex M, instance 163) that measures temperature.
227	**Temperature_meter**	A Meter (see annex M, instance 165) that measures temperature.
228	**Temperature_sensor**	A Sensor (see annex M, instance 211) that senses temperature.
229	**Temperature_switch**	An Automatic_switch (see annex M, instance 79) that switches at a preset temperature
230	**Temperature_transmitter**	A Transmitter (see annex M, instance 233) and a Temperature_instrument (see annex M, instance 225) that transmits a signal representing a measured temperature.
231	**Thermal_conductivity_analyser**	An Analyser (see annex M, instance 76) that determines the thermal conductivity of a substance.
232	**Transducer**	A Control_system_component (see annex M, instance 89) that converts a signal from one form to another.
233	**Transmitter**	A Transducer (see annex M, instance 232) that generates a signal for transmission.
234	**Vapour_pressure_analyser**	An Analyser (see annex M, instance 76) that determines the vapour pressure of a fluid.
235	**Vibration_detector**	A Detector (see annex M, instance 93) that detects vibration.
236	**Vibration_meter**	A Meter (see annex M, instance 165) that measures either the frequency of vibration or the amplitude of vibration or both of these.

Table M.7 – Specified instances of Class_of_facility for instrumentation and control (concluded)

inst.	name	definition
237	**Vibration_monitoring_-system**	A Monitoring_system (see annex M, instance 330) that continuously records vibration, analyses vibration, or both.
NOTE – A Vibration_monitoring_system may also be a Machine_monitoring_system (see annex M, instance 160) and may use vibration measurements to detect damage to a machine.		
238	**Viscosity_analyser**	An Analyser (see annex M, instance 76) that determines the viscosity of a fluid.
239	**Voltage_meter**	A Meter (see annex M, instance 165) that measures electric potential.
240	**Water_content_analyser**	An Analyser (see annex M, instance 76) that determines the water concentration in a fluid or solid.
241	**Water_detector**	A Detector (see annex M, instance 93) that detect the presence of water.
242	**Wobbe_index_analyser**	An Analyser (see annex M, instance 76) that determines the wobbe index in a fluid.

M.3.5 Specified instances of Class_of_facility for piping and insulation

Specified instances of Class_of_facility relevant to piping and insulation are defined in table M.8.

Table M.8 – Specified instances of Class_of_facility for piping and insulation

inst.	name	definition
243	**Break**	A Facility (see 4.2.89) that connects two Piping_systems with different specifications. A Break occurs at a change of Piping_specification (see annex M, instance 718).
244	**Collection_manifold**	A Manifold (see annex M, instance 255) that collects different material streams.
245	**Completion_string**	A String (see annex M, instance 276) that takes fluids from a well or injects fluids into a well.
246	**Distribution_manifold**	A Manifold (see annex M, instance 255) that distributes material streams.
247	**Expansion_bend**	A Piping_system (see annex M, instance 335) that relieves stress within a Piping_assembly (see annex M, instance 716), caused by thermal or other expansion, and that is provided by Pipe_bends (see annex M, instance 708).
248	**Filter**	A Facility that removes solids from a fluid.
249	**In_line_mixer**	A Mixer (see annex M, instance 410) that is a component within a Pipeline (see annex M, instance 261).
250	**In_line_equipment**	A Facility (see 4.2.89) that is within a Pipeline (see annex M, instance 261) and that is provided by an Equipment (see annex M, instance 751).
251	**In_line_filter**	A Filter (see annex M, instance 248) that is a component within a Pipeline (see annex M, instance 261) and that acts within the main material stream conveyed by the Pipeline.

Table M.8 – Specified instances of Class_of_facility for piping and insulation (continued)

inst.	name	definition
252	**Instrument_connection_assembly**	A Facility_assembly (see annex M, instance 33) that is a connection to an Instrument (see annex M, instance 140).
253	**Level_instrument_connection_assembly**	An Instrument_connection_assembly (see annex M, instance 252) that is a connection to a Level_instrument (see annex M, instance 149).
254	**Loading_hose**	A Piping_system (see annex M, instance 335) that loads a Process_material (see 4.2.136) and is provided by a Flexible_hose (see annex M, instance 694).
255	**Manifold**	A Piping_system (see annex M, instance 335) and a Facility_node (see annex M, instance 38 that is connected to three or more branches.
NOTE – A Manifold may be provided by a Piping_assembly (see annex M, instance 716) that consists of tees, bends and Valves connected by short pipes.		
256	**Meter_run_assembly**	A Piping_system (see annex M, instance 335) that ensures stable flow to a Flow_measuring_device (see annex M, instance 121).
257	**Moisture_trap**	A Vapour_trap (see annex M, instance 279) that removes moisture from a flow of vapour.
258	**Network_terminator_node**	A Facility_node (see annex M, instance 38) that is within a Facility_network (see annex M, instance 37) and that may have connections from outside the network.
259	**Nipolet**	A Facility (see 4.2.89) that provides a connection between a Run_pipe (see annex M, instance 272) and a Piping_branch (see annex M, instance 262), and that is provided by an Olet (see annex M, instance 706).
260	**Non_in_line_filter**	A Filter (see annex M, instance 248) that is mounted aside a Pipeline (see annex M, instance 261).
261	**Pipeline**	A Piping_system (see annex M, instance 335) that is an assembly of Piping_segments (see annex M, instance 266).
262	**Piping_branch**	A Facility_branch (see annex M, instance 34) that is part of a Piping_network (see annex M, instance 263).
263	**Piping_network**	A Facility_network (see annex M, instance 37) that is also a Piping_system (see annex M, instance 335).

Table M.8 – Specified instances of Class_of_facility for piping and insulation (continued)

inst.	name	definition
264	**Piping_node**	A Facility_node (see annex M, instance 38) that is within a Piping_network (see annex M, instance 263).
265	**Piping_route**	A Route (see annex M, instance 271) that is within a Piping_network (see annex M, instance 263).
266	**Piping_segment**	A Piping_system (see annex M, instance 335) that is part of a larger Piping_system and that is provided by Piping_components (see annex M, instance 717) with common attributes.
267	**Piping_tracer**	A Facility (see 4.2.89) that heats the outside of a pipe.
NOTE – A Piping_tracer may use electrical energy or steam.		
268	**Pressure_filter**	A Filter (see annex M, instance 248) that operates under pressure.
269	**Pressure_instrument_connection_assembly**	An Instrument_connection_assembly (see annex M, instance 252) that is a connection to a Pressure_instrument (see annex M, instance 189).
270	**Riser**	A Piping_system (see annex M, instance 335) that transfers fluid vertically upwards.
271	**Route**	A Facility (see 4.2.89) that is a set of Facility_branches (see annex M, instance 34) connected together in sequence so that they lead from a source to a destination.
272	**Run_pipe**	A Facility (see 4.2.89) that carries the main flow of fluid.
273	**Steam_trap**	A Vapour_trap (see annex M, instance 279) that captures condensate from a Steam_system (see annex M, instance 351).
274	**Straightener**	A Piping_system (see annex M, instance 335) that stabilises a flow of fluid.
275	**Strainer**	A Filter (see annex M, instance 248) that is located upstream of an Equipment (see annex M, instance 751) to protect it from damage by solids.
276	**String**	A Piping_system (see annex M, instance 335) that gathers fluids from different sources.
277	**Sweepolet**	A Facility (see 4.2.89) that provides a connection between a Run_pipe (see annex M, instance 272) and a Piping_branch (see annex M, instance 262), and that is provided by an Olet (see annex M, instance 706).

Table M.8 – Specified instances of Class_of_facility for piping and insulation (concluded)

inst.	name	definition
278	**Temperature_instrument_connection_assembly**	An Instrument_connection_assembly (see annex M, instance 252) that is a connection to a Temperature_instrument (see annex M, instance 225).
279	**Vapour_trap**	A Facility (see 4.2.89) that enables condensed liquid to drain from a Piping_system (see annex M, instance 335) containing vapour.
280	**Vent**	A Facility (see 4.2.89) that allows the exit or entry of vapour.
281	**Well_head**	A Piping_system (see annex M, instance 335) that is at the top of a Well (see annex M, instance 363) and that is an entire assembly above a casing including a tree and all spools and hangers.

M.3.6 Specified instances of Class_of_facility for plants and systems

Specified instances of Class_of_facility relevant to plants and complete systems are defined in table M.9.

Table M.9 – Specified instances of Class_of_facility for plants and systems

inst.	name	definition
282	**Air_compression_system**	A System (see annex M, instance 354) that compresses air for distribution.
283	**Auxiliary_system**	A System (see annex M, instance 354) that supports another Facility which provides the main service.
284	**Cathodic_protection_system**	A Facility (see 4.2.89) that prevents voltaic corrosion by the application of a differential potential.
285	**Combined_cycle_power_station**	An Electric_power_station (see annex M, instance 303) that contains both Gas_turbines (see annex M, instance 401) and Steam_turbines (see annex M, instance 432).
286	**Communication_system**	A System (see annex M, instance 354) that enables communication.
287	**Compressed_air_system**	A Gas_distribution_system (see annex M, instance 316) that distributes air from an Air_compression_system (see annex M, instance 282) to its consumers.
288	**Control_and_monitoring_system**	A System (see annex M, instance 354) that either: – controls an Activity (see 4.2.7); – obtains information about an Activity; – obtains information about a Material processed by an Activity; – obtains information about a Material plant item that performs an Activity; or – does a combination of these.

Table M.9 – Specified instances of Class_of_facility for plants and systems (continued)

inst.	name	definition
289	**Corrosion_monitoring_system**	A Monitoring_system (see annex M, instance 330) that obtains information about the amount of corrosion.
290	**Crude_oil_cavern**	A Facility (see 4.2.89) that is a geological feature which stores crude oil.
291	**Data_acquisition_system**	A System (see annex M, instance 354) that collects data.
292	**Discharge_pipeline**	A Pipeline (see annex M, instance 261) that transports effluent to the environment.
293	**Distribution_network**	A Facility_network (see annex M, instance 37) that distributes Material (see 4.2.110), information, or energy.
294	**Diving_support_system**	A System (see annex M, instance 354) that supports divers.
295	**Drainage_culvert**	A Drainage_system (see annex M, instance 296) that collects superfluous fluid and that is open to the atmosphere.
296	**Drainage_system**	An Effluent_treatment_system (see annex M, instance 298) that collects superfluous fluids.
297	**Drilling_rig**	A Facility that drills holes in the earth.
298	**Effluent_treatment_system**	A System (see annex M, instance 354) that collects and treats superfluous fluids before discharging them to the environment.
299	**Electrical_energy_system**	An Energy_system (see annex M, instance 306) that generates or distributes electric energy.
300	**Electrical_network**	A Facility_network (see annex M, instance 37) that permits the flow of electric current.
301	**Electric_power_distribution_system**	An Electrical_network (see annex M, instance 300) and an Energy_system (see annex M, instance 306) that distributes electric energy.
302	**Electric_power_generation_unit**	A Unit (see annex M, instance 359) and an Electrical_energy_system (see annex M, instance 299) that generates electric energy.
303	**Electric_power_station**	A Facility (see 4.2.89) that generates electric power for transmission or distribution.

Table M.9 – Specified instances of Class_of_facility for plants and systems (continued)

inst.	name	definition
304	**Electrical_system**	A System (see annex M, instance 354) that uses electricity to transfer energy or information.
305	**Emergency_shut_down_-system**	A Safety_system (see annex M, instance 346) and a Control_-and_monitoring_system (see annex M, instance 288) that that stops an Activity (see 4.2.7) in a controlled way in an emergency.
306	**Energy_system**	A System (see annex M, instance 354) that supplies, transports and/or disposes of energy.
307	**Final_treatment_basin**	An Effluent_treatment_system (see annex M, instance 298) that is the last to process effluent.
308	**Fire_detection_system**	A Safety_system (see annex M, instance 346) and a Control_-and_monitoring_system (see annex M, instance 288) that that detects the existence of a fire.
309	**Fire_fighting_system**	A Safety_system (see annex M, instance 346) that eliminates a fire.
310	**Fixed_drilling_rig**	A Drilling_rig (see annex M, instance 297) that is not mobile.
311	**Flare_system**	A System (see annex M, instance 354) that burns waste Process_material (see 4.2.136) to reduce air pollution and to ensure safety.
312	**Flue_gas_system**	A System (see annex M, instance 354) that acts upon flue gas from a Fossil_fuel_heat_generation_system (see annex M, instance 313).
313	**Fossil_fuel_heat_-generation_system**	A Facility (see 4.2.89) that generates heat by burning fossil fuel.
314	**Fossil_fuel_supply_system**	A Facility (see 4.2.89) that that transports fossil fuel to a Fossil_fuel_heat_generation_system (see annex M, instance 313).
315	**Gas_detection_system**	A Safety_system (see annex M, instance 346) that detects gasses present in concentrations higher than a preset amount.
316	**Gas_distribution_system**	A Piping_network (see annex M, instance 263) that distributes gas.
317	**Gas_turbine_fuel_system**	A Fossil_fuel_supply_system (see annex M, instance 314) that supplies fuel for a gas turbine.

Table M.9 – Specified instances of Class_of_facility for plants and systems (continued)

inst.	name	definition
318	**HVAC_system**	A System (see annex M, instance 354) that maintains atmospheric conditions within an enclosed space.
319	**Injection_system**	A System (see annex M, instance 354) that injects small amounts of one Process_material (see 4.2.136) into another Process_material.
320	**Instrument_network**	A Facility_network (see annex M, instance 37) that is composed of Instruments (see annex M, instance 140).
321	**Intra_plant_network**	A Facility_network (see annex M, instance 37) that is within the battery limits of a Process_plant (see annex M, instance 338).
322	**Inter_plant_network**	A Facility_network (see annex M, instance 37) that contains Process_plants (see annex M, instance 338 as Facility_nodes (see annex M, instance 38).
323	**Lighting_system**	An Electrical_system (see annex M, instance 304) that provides lighting.
324	**Loading_system**	A System (see annex M, instance 354) that loads or unloads Material (see 4.2.110) from a conveyance such as a ship, road or rail vehicle.
325	**Marine_mooring_system**	A Marine_system (see annex M, instance 326) that moors ships in open water.
326	**Marine_system**	A System (see annex M, instance 354) that is used in a marine environment.
327	**Materials_handling_-system**	A System (see annex M, instance 354) that handles solid Material (see 4.2.110).
328	**Mobile_land_drilling_rig**	A Drilling_rig (see annex M, instance 297) that is mobile on land.
329	**Mobile_well_test_unit**	A Facility (see 4.2.89) that is mobile and that tests different Wells (see annex M, instance 363).

Table M.9 – Specified instances of Class_of_facility for plants and systems (continued)

inst.	name	definition
330	**Monitoring_system**	A Control_and_monitoring_system (see annex M, instance 288) that either: – obtains information about an Activity (see 4.2.7); – obtains information about a Material processed by an Activity; – obtains information about a Material plant item that performs an Activity; or – does a combination of these; but does not control an Activity.
331	**Navigation_system**	A System (see annex M, instance 354) that determines location and how to get from one location to another.
332	**Nuclear_fuel_handling_system**	A System (see annex M, instance 354) that moves nuclear fuel within a Process_plant (see annex M, instance 338).
333	**Nuclear_power_station**	An Electric_power_station (see annex M, instance 303) that uses nuclear energy to generate electricity.
334	**Pig_launching_system**	A System (see annex M, instance 354) that inserts a pig into a Pipeline (see annex M, instance 261).
335	**Piping_system**	A Distribution_network (see annex M, instance 293) that is provided by Pipes (see annex M, instance 707).
336	**Pontoon**	A Facility (see 4.2.89) that bears objects on water.
337	**Pressure_relief_system**	A Safety_system (see annex M, instance 346) that reduces pressure to ensure safety.
338	**Process_plant**	A Facility (see 4.2.89) that performs a chemical physical or transport process, including the storage of Process_material (see 4.2.136). A Plant is identified as a single unit for the purposes of management and ownership.
NOTE – The term 'process plant' is a defined in 3.5.20.		
339	**Process_system**	A System (see annex M, instance 354) that transforms one or more Process_materials (see 4.2.136) into one or more other Process_materials.

Table M.9 – Specified instances of Class_of_facility for plants and systems (continued)

inst.	name	definition
340	**Process_train**	A Process_system (see annex M, instance 339) that consists of more than one Facility in sequence.
341	**Process_unit**	A Unit (see annex M, instance 359 that changes the composition of a Process_material (see 4.2.136) or Process_materials through mixing, separation and/or reaction.
342	**Processing_system**	A System (see annex M, instance 354) that improves the quality of Material objects (see 4.2.110).
343	**Production_system**	A System (see annex M, instance 354) that produces a product from a natural resource.
344	**Refrigeration_system**	A Cooler (see annex M, instance 45) that cools below the temperature of the surrounding atmosphere.
345	**Renewable_energy_-system**	A System (see annex M, instance 354) that generates power a renewable source such as solar energy, wind, tides or biomass.
346	**Safety_system**	A System (see annex M, instance 354) that ensures safety.
347	**Settlement_basin**	A Separator (see annex M, instance 502) that allows suspended solids within a fluid to settle.
348	**Stack**	A Facility (see 4.2.89) that transports flue gas upwards to a suitable location in the atmosphere.
349	**Starter_system**	A System (see annex M, instance 354) that starts an Activity (see 4.2.7).
350	**Steam_generation_unit**	A Unit (see annex M, instance 359) that converts liquid water into saturated or superheated steam.
351	**Steam_system**	A System (see annex M, instance 354) that generates, distributes or uses saturated or superheated steam.
352	**Storage_system**	A System (see annex M, instance 354) that holds a Material (see 4.2.110) for a period of time, so that it is available when required.
353	**Storage_unit**	A Unit (see annex M, instance 359) that holds Material (see 4.2.110) for a period of time so that it is available when required.

Table M.9 – Specified instances of Class_of_facility for plants and systems (continued)

inst.	name	definition
354	**System**	A Facility_assembly (see annex M, instance 33) that performs a clearly identified Activity (see 4.2.7) as a whole.
NOTE – A System may be part of a Unit (see annex M, instance 359).		
355	**Telecommunications_-system**	A Communication_system (see annex M, instance 286) that enables communication over a long distance.
356	**Transportation_system**	A System (see annex M, instance 354) that moves Material objects (see 4.2.110) from one location to another.
357	**Transmission_system**	A System (see annex M, instance 354) that transmits mechanical energy between rotating Shafts (see annex M, instance 978).
358	**Uninterrupted_power_-supply_system**	An Electrical_energy_system (see annex M, instance 299) that is fault tolerant so that it continues to supply energy, even if the usual source of electrical energy is lost.
359	**Unit**	A Facility (see 4.2.89) that executes a part of a physical, chemical or transport process, including storage of Process_material (see 4.2.136). A Unit is a major part of a Process_plant (see annex M, instance 338).
NOTE – A Unit usually contains one or more Systems (see annex M, instance 354).		
360	**Utility_system**	A System (see annex M, instance 354) that supports the main process Units (see annex M, instance 359).
361	**Utility_unit**	A Unit (see annex M, instance 359) that carries out a secondary processing of material or energy for process Units.
362	**Venting_system**	A Safety_system (see annex M, instance 346) that enables fluids to escape into the atmosphere.
363	**Well**	A Facility that is a collection of zero or more Well_bores (see annex M, instance 366) drilled into the earth.
364	**Well_cluster**	A Facility (see 4.2.89) that is a collection of Wells (see annex M, instance 363).
365	**Well_pulling_hoist**	A Facility (see 4.2.89) that pulls things out of a Well (see annex M, instance 363).

Table M.9 – Specified instances of Class_of_facility for plants and systems (concluded)

inst.	name	definition
366	**Well_bore**	A Facility (see 4.2.89) that explores or produces subsurface resources or provides services for their production.
367	**Wire_line_unit**	A Facility (see 4.2.89) that handles wire lines at a well head.

M.3.7 Specified instances of Class_of_facility for rotating and reciprocating equipment

Specified instances of Class_of_facility relevant to rotating and reciprocating equipment are defined in table M.10.

Table M.10 – Specified instances of Class_of_facility for rotating and reciprocating equipment

inst.	name	definition
368	**Air_filter**	A Filter (see annex M, instance 248) that removes particles from air.
369	**Air_starting_system**	A Starting_system (see annex M, instance 429) that uses compressed air as a power source.
370	**Battery_start_system**	A Starting_system (see annex M, instance 429) that uses electric storage batteries.
371	**Boiler_feed_water_pump**	A Pump_system (see annex M, instance 420 that supplies feed water to a Boiler (see annex M, instance 42).
372	**Breather**	A Facility (see 4.2.89) that maintains atmospheric pressure within an enclosure.
373	**Casing_drain**	A Drain (see annex M, instance 479) that drains a casing.
374	**Casing_vent**	A Vent (see annex M, instance 280) that releases the pressure in a casing.
375	**Centrifuge**	A Separator (see annex M, instance 502) that uses centrifugal force to separate phases of different densities.
376	**Clutch**	A Transmission_system (see annex M, instance 357) that connects or disconnects a Driver (see annex M, instance 389) from a driven Shaft (see annex M, instance 978).
377	**Compressor_system**	A Facility that adds mechanical energy to a gas in order to increase its pressure.

Table M.10 – Specified instances of Class_of_facility for rotating and reciprocating equipment (continued)

inst.	name	definition
378	**Compressor_seal_system**	A Seal_flush_system (see annex M, instance 426) that ensures proper performance of one or more Compressor_seals (see annex M, instance 877).
379	**Constant_level_oiler**	A Lubrication_system (see annex M, instance 408) that maintains oil level at a constant height within a Bearing (see annex M, instance 854 housing.
380	**Conveyer**	A Facility that transports solid materials by means of a moving flat belt or driven rollers.
381	**Cooling_water_piping**	A Piping_system (see annex M, instance 335) that transports cooling water.
382	**Cooling_water_pump**	A Pump_system (see annex M, instance 420) that pumps cooling water.
383	**Coupling**	A Transmission_system (see annex M, instance 357) that connects a Driver (see annex M, instance 389) to a Driven_equipment (see annex M, instance 784).
384	**Cryogenic_expander**	An Expander_system (see annex M, instance 395) that expands gas and lowers its temperature to below zero degrees Celsius.
385	**Cryogenic_pump**	A Pump_system (see annex M, instance 420) that pumps liquid at temperatures below zero degrees Celsius.
386	**Decanting_centrifuge**	A Centrifuge (see annex M, instance 375) that operates continuously.
387	**Deep_well_pump**	A Pump_system (see annex M, instance 420) that operates down a Well_bore (see annex M, instance 366).
388	**Dewaxing_filter**	A Filter (see annex M, instance 248) that separates wax from oil by freezing the wax and filtering the solid wax from the liquid.
NOTE – The service is usually provided by a Rotary_drum_filter (see annex M, instance 727).		
389	**Driver**	A Facility (see 4.2.89) that provides rotational or reciprocating energy to a Driven_equipment item (see annex M, instance 784).
390	**Discharge_piping**	A Piping_system (see annex M, instance 335) that discharges pressurised fluid.
391	**Electric_motor**	A Driver (see annex M, instance 389) that obtains its energy from electric current.

Table M.10 – Specified instances of Class_of_facility for rotating and reciprocating equipment (continued)

inst.	name	definition
392	**Electro_magnetic_pump**	A Pump_system (see annex M, instance 420) that pumps conductive liquid by inducing electric currents within the liquid.
393	**Engine**	A Driver (see annex M, instance 389) that obtains its energy by burning a fuel.
394	**Exhaust_piping**	A Piping_system (see annex M, instance 335) that transports exhaust gas or steam.
395	**Expander_system**	A Facility (see 4.2.89) that obtains energy by expanding a pressurised fluid.
396	**Expander_seal_system**	A Seal_flush_system (see annex M, instance 426) that ensures proper performance of one or more Expander_seals (see annex M, instance 896).
397	**Filtering_centrifuge**	A Centrifuge (see annex M, instance 375) that separates solids from liquids.
398	**Fire_fighting_pump**	A Pump_system (see annex M, instance 420) that pumps water to fight fires.
399	**Forced_draft_fan**	A Facility (see 4.2.89) that generates an enhanced flow of combustion air to a fired Heater (see annex M, instance 59).
NOTE – A Forced_draft_fan service is provided by a Fan (see annex M, instance 788).		
400	**Fuel_system**	An Auxiliary_system (see annex M, instance 283) that provides liquid or gas fuel at an air mixing injection point.
401	**Gas_turbine**	A Turbine (see annex M, instance 434) that burns a mixture of compressed air and gas or liquid fuel.

Table M.10 – Specified instances of Class_of_facility for rotating and reciprocating equipment (continued)

inst.	name	definition
402	**Generator**	A Facility that converts mechanical energy into electrical energy.
NOTE – A Generator does not include a Driver (see annex M, instance 389).		
403	**Heating_system**	A System (see annex M, instance 354) that heats an Equipment (see annex M, instance 751) or a Process_material (see 4.2.136) ensure that it is at its correct operational temperature.
404	**Hydraulic_turbine**	A Turbine (see annex M, instance 434) that recovers energy from a moving liquid.
NOTE – A Hydraulic_turbine service is provided by a Centrifugal_pump (see annex M, instance 774) running in reverse.		
405	**Inlet_screen**	A Filter (see annex M, instance 248) that removes solid particles from fluids taken from the environment and that has a large flow area.
406	**Liquid_expander**	An Expander_system (see annex M, instance 395) that operates with liquids.
407	**Lubricating_oil_heater**	A Heater (see annex M, instance 59) that heats lubricating oil.
NOTE – A Lubricating_oil_heater may be used during the start-up of an Equipment (see annex M, instance 751) and during its operation.		
408	**Lubrication_system**	An Auxiliary_system (see annex M, instance 283) that provides lubrication.
NOTE – The lubrication may be to a moving part, a stuffing box or a cylinder.		
409	**Metering_pump**	A Pump_system (see annex M, instance 420) that delivers liquid in small amounts that are both accurate and adjustable by means of capacity control.
NOTE – The service is provided by a Positive_displacement_pump (see annex M, instance 810).		
410	**Mixer**	A Facility (see 4.2.89) that mixes fluids.

Table M.10 – Specified instances of Class_of_facility for rotating and reciprocating equipment (continued)

inst.	name	definition
411	**Oil_conditioner**	A Centrifuge (see annex M, instance 375) that removes free and dissolved water and entrained gasses from oil.
412	**Oil_filter**	A Filter (see annex M, instance 248) that separates solids and pollution from oil.
413	**Oil_pump**	A Pump_system (see annex M, instance 420) that generates the required oil pressure in a Lubrication_system (see annex M, instance 408) or a Seal_oil_system (see annex M, instance 425).
414	**Oil_system**	An Auxiliary_system (see annex M, instance 283) that provides pressurized oil to an Equipment item (see annex M, instance 751).
415	**Overhead_tank**	A Storage_system (see annex M, instance 352) that stores a liquid at a high location to provide a pressure head.
NOTE – An Overhead_tank may be above a Seal (see annex M, instance 971) and thereby provides a pressure head to the Seal after a trip for coast down, block in and depressurisation of an Equipment (see annex M, instance 751).		
416	**Power_generation_gas_-turbine**	A Gas_turbine (see annex M, instance 401) that is a Driver (see annex M, instance 389) for a Generator (see annex M, instance 402).
417	**Pump_motor_pressure_-balancing_tube**	A Piping_system (see annex M, instance 335) that provides a hydraulic balance between a Pump suction and the bottom of a submersible Electric_motor (see annex M, instance 391) oil reservoir.
418	**Process_pump**	A Pump_system (see annex M, instance 420) that increases the pressure of a fluid Process_material (see 4.2.136).

Table M.10 – Specified instances of Class_of_facility for rotating and reciprocating equipment (continued)

inst.	name	definition
419	**Pulsation_damper**	A Facility (see 4.2.89) that reduces pulsation fluctuations in a Piping_system (see annex M, instance 335).
NOTE – Pulsation fluctuations may be caused by the discontinuous operation of a Pump_system (see annex M, instance 420) or Compressor_system (see annex M, instance 377). The Facility is provided by a Vessel (see annex M, instance 1113).		
420	**Pump_system**	A Facility that adds mechanical energy to a liquid in order to increase its pressure.
NOTE – Energy may be added continuously or periodically.		
421	**Pump_seal_flush_system**	A Seal_flush_system (see annex M, instance 426) that provides Seal (see annex M, instance 971) flushing for Pump_equipment (see annex M, instance 812) Seals.
422	**Purge_air_system**	An Auxiliary_system (see annex M, instance 283) that provides pressurised air to one or more Equipment items (see annex M, instance 751) or Equipment auxiliaries in order to flush out vapours.
423	**Seal_flush_piping**	A Piping_system (see annex M, instance 335) that is part of a Seal_flush_system (see annex M, instance 426).
424	**Seal_gas_system**	An Auxiliary_system (see annex M, instance 283) that ensures the proper operation of dry gas Seals (see annex M, instance 971), including the control of leakage to flare or to vent.
425	**Seal_oil_system**	An Auxiliary_system (see annex M, instance 283) that provides oil to Seals (see annex M, instance 971).

Table M.10 – Specified instances of Class_of_facility for rotating and reciprocating equipment (concluded)

inst.	name	definition
426	**Seal_flush_system**	An Auxiliary_system (see annex M, instance 283) that flushes one or more Seals (see annex M, instance 971) with a pressurised liquid.
427	**Self_priming_pump**	A Pump_system (see annex M, instance 420) that can begin to operate without first being filled with liquid.
NOTE – A Centrifugal_pump (see annex M, instance 774) that is designed for use as a Self_priming_pump has an air separator on the discharge side of the Pump to accomplish air separation and also acts as a Reservoir (see annex M, instance 499) to provide liquid sealing during a re-prime or priming cycle.		
428	**Solid_mixer**	A Mixer (see annex M, instance 410) that mixes solids in suspension.
429	**Starting_system**	An Auxiliary_system (see annex M, instance 283) that starts a main System (see annex M, instance 354).
430	**Steam_engine**	An Engine (see annex M, instance 393 that works by boiling water to produce steam.
431	**Steam_piping**	A Piping_system (see annex M, instance 335) that transports steam.
432	**Steam_turbine**	A Turbine (see annex M, instance 434) that is driven by steam.
433	**Suction_piping**	A Piping_system (see annex M, instance 335) that transports fluid to the suction side of a Pump_system (see annex M, instance 420) or Compressor_system (see annex M, instance 377).
434	**Turbine**	A Driver (see annex M, instance 389) that converts energy in a fluid into kinetic energy in a Rotor (see annex M, instance 968) by pressure of the fluid upon blades (or Vanes - see annex M, instance 1008) fastened to the Rotor.
435	**Tank_mixer**	A Mixer (see annex M, instance 410) that mixes the contents of a Tank (see annex M, instance 1108).
436	**Vacuum_pump_system**	A Facility (see 4.2.89) that takes gas at low pressure and discharges at atmospheric pressure.
437	**Variable_drive**	A Transmission_system (see annex M, instance 357) that provides stepless speed control to a driven Shaft (see annex M, instance 978).

M.3.8 Specified instances of Class_of_facility for valves

Specified instances of Class_of_facility relevant to Valve_system (see annex M, instance 466) are defined in table M.11.

Table M.11 – Specified instances of Class_of_facility for valves

inst.	name	definition
438	**Air_release_relief_valve**	A Relief_valve (see annex M, instance 461) that releases air.
439	**Automatic_control_valve**	A Control_valve (see annex M, instance 446) that transform a control signal into Valve_system (see annex M, instance 466) movement controlling flow, pressure and temperature.
440	**Bleed_valve**	A Valve_system (see annex M, instance 466) that draws off a fluid.
441	**Blending_valve**	A Valve_system (see annex M, instance 466) that regulates flow input or inputs.
NOTE – The service is often provided by a Valve of multi-port design, such as a Globe_valve (see annex M, instance 1032).		
442	**Block_valve**	A Valve_system (see annex M, instance 466) that shuts off a line.
NOTE – A Block_valve is often also called a 'on/off valve', an 'isolation valve', a 'shut-off valve' and a 'stop valve'.		
443	**Blow_off_valve**	A Valve_system (see annex M, instance 466) that depressurizes a Piping_system (see annex M, instance 335) or Equipment (see annex M, instance 751).
444	**Bypass_valve**	A Valve_system (see annex M, instance 466) that is located in a bypass.
445	**Check_valve**	A Valve_system (see annex M, instance 466) that is self acting and prevents backward flow.
446	**Control_valve**	A Final_control_device (see annex M, instance 113) and a Valve_system (see annex M, instance 446) that regulates flow, pressure and temperature.

Table M.11 – Specified instances of Class_of_facility for valves (continued)

inst.	name	definition
447	**Diver_operated_valve**	A Valve_system (see annex M, instance 466) that is operated in combination with other Valve_systems to direct flow streams.
448	**Diverter_valve**	A Valve_system (see annex M, instance 466) that has multiple connectors to divert flow in several directions and prevent intermixing.
449	**Excess_flow_check_valve**	A Check_valve (see annex M, instance 445) that closes automatically when flow exceeds a specific rate.
450	**Foot_valve**	A Check_valve (see annex M, instance 445) that provides an open inlet for total immersion on a pump suction line.
451	**Foot_valve_with_strainer**	A Foot_valve (see annex M, instance 450) that has a Strainer (see annex M, instance 275).
452	**Four_way_valve**	A Diverter_valve (see annex M, instance 448) that has four connectors to divert flow in several directions and prevent intermixing.
453	**In_line_valve**	A Valve_system (see annex M, instance 466) that is mounted in a Piping_system (see annex M, instance 335).
454	**Mixing_valve**	A Control_valve (see annex M, instance 446) that uses a control element to regulate a flow input or inputs, or to control temperature in conjunction with a thermostat.
NOTE – A Mixing_valve is usually self operating.		
455	**Mud_discharge_valve**	A Mud_valve (see annex M, instance 456) that controls the discharge of muddy substances.
456	**Mud_valve**	A Valve_system (see annex M, instance 466) that handles muddy substances.
457	**Pressure_reducing_valve**	A Control_valve (see annex M, instance 446) that reduces pressure in a flow, and maintains the downstream line pressure at a set level irrespective of changes to the upstream line pressure.

Table M.11 – Specified instances of Class_of_facility for valves (continued)

inst.	name	definition
458	**Pressure_relief_valve**	A Relief_valve (see annex M, instance 461) that has a degree of opening proportional to the pressure and that handles only liquids.
459	**Pressure_vacuum_safety_valve**	A Safety_valve (see annex M, instance 463) that can both release gas to reduces excess pressure or admit gas to prevent a vacuum forming.
NOTE – A Pressure_vacuum_safety_valve is used when filling or emptying a Pipeline (see annex M, instance 261) or Tank (see annex M, instance 1108).		
460	**Quick_acting_valve**	A Valve_system (see annex M, instance 466) that acts quickly.
461	**Relief_valve**	A Valve_system (see annex M, instance 466) that is for the protection of a Vessel (see annex M, instance 1113) against excess pressure.
NOTE – A Relief_valve may be required by a code of practice. A Relief_valve is usually a direct acting Valve that has a lift is proportional to the amount by which the pressure exceeds a set point.		
462	**Remote_operated_valve**	A Valve_system (see annex M, instance 466) that is opened and closed by a Remote_control_loop (see annex M, instance 204).
463	**Safety_valve**	A Valve_system (see annex M, instance 466) that either: – automatically releases gas from a pressure system if the pressure exceeds a set limit and closes when pressure falls below a set limit; or – automatically allows gas into a pressure system if the pressure falls below a set limit and closes when pressure exceeds a set limit; or – both. .
464	**Stop_check_valve**	A Check_valve (see annex M, instance 445) that can be screwed down into a stop or closed position.
465	**Three_way_valve**	A Valve_system (see annex M, instance 466) that has three connectors to divert flow in several directions and prevent intermixing.

Table M.11 – Specified instances of Class_of_facility for valves (concluded)

inst.	name	definition
466	**Valve_system**	A Facility (see 4.2.89) that isolates, or controls fluid flow direction or rate.
NOTE – A Valve_system service is provided by a Valve (see annex M, instance 1063).		

M.3.9 Specified instances of Class_of_facility for vessels

Specified instances of Class_of_facility relevant to Vessels (see annex M, instance 1113) are defined in table M.12.

NOTE – A Facility classified by one of these instances of Class_of_Facility is a service that is provided by a Vessel or an assembly containing a Vessel or a service relevant to the operation of such a Facility.

Table M.12 – Specified instances of Class_of_facility for Vessels

inst.	name	definition
467	**Atmospheric_vessel**	A Facility (see 4.2.89) that contains or stores fluids with an open connection to the atmosphere.
468	**Bulk_product_-compartment**	A Storage_system (see annex M, instance 352) that stores bulk solid Material.
469	**Catalyst_hopper**	A Storage_system (see annex M, instance 352) that stores catalyst.
NOTE – A Catalyst_hopper service is provided by a Hopper (see annex M, instance 1093).		
470	**Catalyst_piping**	A Piping_system (see annex M, instance 335) that transports and contains catalyst.
471	**Coalescer**	A Separator (see annex M, instance 502) that continuously separates a liquid phase from a mixture.
472	**Cyclone**	A Separator (see annex M, instance 502) that separates two fluids with different densities by rotation of the fluids.
473	**Debutaniser**	A Distillation_unit (see annex M, instance 478) that separates butane from a mixture.
NOTE – The service is provided by a Column (see annex M, instance 1084) with auxiliary equipment.		
474	**Deethaniser**	A Distillation_unit (see annex M, instance 478) that separates ethane from a mixture.
NOTE – The service is provided by a Column (see annex M, instance 1084) with auxiliary equipment.		

Table M.12 – Specified instances of Class_of_facility for Vessels (continued)

inst.	name	definition
475	**Depropaniser**	A Distillation_unit (see annex M, instance 478) that separates propane from a mixture.
NOTE – The service is provided by a Column (see annex M, instance 1084) with auxiliary equipment.		
476	**Desalter**	A Facility (see 4.2.89) that removes salt water from oil.
477	**Distillation_column**	A Facility (see 4.2.89) that performs a distillation process.
478	**Distillation_unit**	A Unit (see annex M, instance 359) that separates fractions with different boiling ranges from a mixture by means of distillation.
479	**Drain**	A Facility (see 4.2.89) that empties something of a fluid.
480	**Drain_valve**	A Valve_system (see annex M, instance 466) that is part of a Drain (see annex M, instance 479).
481	**Drum**	A Facility (see 4.2.89) that lets gasses escape from process fluids and this is provided by a Vessel (see annex M, instance 1113).
482	**Extraction_column**	A Facility (see 4.2.89) that separates components from a fluid by means of physical extraction.
NOTE – The service is provided by a Column (see annex M, instance 1084).		
483	**Electrical_tracer**	A Piping_tracer (see annex M, instance 267) that uses electrical energy for heating.
484	**Flash_tower**	A Facility (see 4.2.89) that spays a liquid mixture in order to drive of some of the more volatile constituents.
NOTE – The service is provided by a Column (see annex M, instance 1084).		
485	**Gas_holder**	A Facility (see 4.2.89) that stores gaseous media.
NOTE – The service is provided by a Tank (see annex M, instance 1108).		

Table M.12 – Specified instances of Class_of_facility for Vessels (continued)

inst.	name	definition
486	**Gas_solid_separator**	A Separator (see annex M, instance 502) that separates a gas from a solid.
487	**Hydrocracker_reactor**	A Reactor (see annex M, instance 497) that that performs a hydrocracking reaction.
488	**Hydrodesulphurizer**	A Reactor (see annex M, instance 497) that performs a desuphurisation reaction.
489	**Hydrotreater_reactor**	A Reactor (see annex M, instance 497) that performs a hydrogen reaction.
490	**Jacket**	A Facility (see 4.2.89) that creates an enclosed space around the whole or part of a Vessel (see annex M, instance 1113) in order to contain a fluid for heat transfer to the Vessel contents.
491	**Knock_out_drum**	A Drum (see annex M, instance 481) that separates liquid from a vapour stream.
492	**Main_fractionator**	A Distillation_unit (see annex M, instance 478) that is a major component of a process plant.
NOTE – The service is provided by a Column (see annex M, instance 1084) with auxiliary equipment.		
493	**Membrane**	A Filter (see annex M, instance 248) that sensitive at a molecular level
494	**Mud_pit**	A Storage_system (see annex M, instance 352) that stores mud.
495	**Packed_product_-compartment**	A Storage_system (see annex M, instance 352) that stores product in individual containers rather than in bulk.
496	**Platformer_reactor**	A Reactor (see annex M, instance 497) that performs the platforming reaction.
497	**Reactor**	A Facility (see 4.2.89) that contains Materials that are undergoing a chemical reaction.
NOTE – The service is provided by a Vessel (see annex M, instance 1113).		
498	**Regenerator**	A Reactor (see annex M, instance 497) that brings a fluid back to its original quality.

Table M.12 – Specified instances of Class_of_facility for Vessels (continued)

inst.	name	definition
499	**Reservoir**	A Storage_vessel (see annex M, instance 507) that contains a supply of liquid necessary for the operation of a System (see annex M, instance 354).
NOTE – A Reservoir is usually at atmospheric pressure.		
500	**Sand_trap_system**	A System (see annex M, instance 354) that collects and removes sand.
501	**Scrubber**	A Distillation_column (see annex M, instance 477) that separates water.
502	**Separator**	A Facility (see 4.2.89) that separates a Material (see 4.2.110) that is a mixture into parts.
NOTE – The separation may be on the basis of Phase (see 4.2.123), chemical composition or other critereon.		
503	**Septic_tank**	A Facility (see 4.2.89) that stores domestic sewerage.
504	**Settler**	A Separator (see annex M, instance 502) that uses time to separate phases.
505	**Silo**	A Storage_system (see annex M, instance 352) that stores solid particles.
NOTE – The service is provided by a Vessel (see annex M, instance 1113) with a bottom in the shape of a cone.		
506	**Splitter**	A Distillation_column (see annex M, instance 477) that that splits a fluid into two fractions.
507	**Storage_vessel**	A Storage_system (see annex M, instance 352) that stores fluid.
NOTE – The service is provided by a Vessel (see annex M, instance 1113).		
508	**Stripper**	A Distillation_column (see annex M, instance 477) that removes light components from a fluid.
509	**Surge_basin**	A Facility (see 4.2.89) that prevents surges in open channels and thereby protects Pump_equipment (see annex M, instance 812) from cavitation.
510	**Three_phase_separator**	A Separator (see annex M, instance 502) that separates three fluids in different phases.
NOTE – The fluids are usually gas, water and another liquid.		

Table M.12 – Specified instances of Class_of_facility for Vessels (concluded)

inst.	name	definition
511	**Vent_valve**	A Valve_system (see annex M, instance 466) that is part of a Vent (see annex M, instance 280).
512	**Water_seal_vessel**	A Facility (see 4.2.89) that prevents gas back flow using a water seal.

M.3.10 Specified instances of Class_of_facility for Logical_information_carrier

Specified instances of Class_of_facility relevant to Logical_information_carriers (see 4.2.108) are defined in table M.13.

Table M.13 – Specified instances of Class_of_facility for Logical_information_carrier

inst.	name	definition
513	**Computer_file**	A Logical_information_carrier (see 4.2.108) that provides the storage of Information_content (see 4.2.98) within a computer system.

M.4 Specified instances of Class_of_information_content

The specified instances of Class_of_information_content (see 4.2.27) are defined in tables in clause M.4.

NOTE – Each instance of the AIM entity **standard_class_of_information_content** (see 5.2.3.156) has a **name** attribute inherited from **group**.

This attribute is one of the keywords listed in the 'name' column of the tables in clause M.4 and indicates the corresponding specified instance of Class_of_information_content.

M.4.1 Specified instances of Class_of_information_content for design documentation

Specified instances of Class_of_information _content relevant to design documentation are defined in table M.14.

NOTE – The instances of Information_content of the classes defined here are created as a process plant is designed in order to hold information about the design.

Table M.14 – Specified instances of Class_of_information_content for design documentation

inst.	name	definition
514	**Equipment_specification**	An Information_content (see 4.2.98) that describes an Equipment (see annex M, instance 751) and that includes functional requirements, process design conditions, material specifications, insulation requirements and tracing requirements.
515	**P&ID**	An Information_content that is a piping_and_instrumentation_diagram.
NOTE – The term 'piping_and_instrumentation_diagram' is defined in 3.5.19.		
516	**Piping_specification_document**	An Information_content (see 4.2.98) that specifies a set of typical Piping_components (see annex M, instance 717) and the process conditions for which their use is valid.

Table M.14 – Specified instances of Class_of_information_content for design documentation (concluded)

inst.	name	definition
517	**Material_of_-construction_specification**	An Information_content (see 4.2.98) that specifies the substance of which a Material (see 4.2.110) is made and its fabrication history; that specifies the properties of the construction material (see 3.5.8) that depend upon its substance and its fabrication history; or both.
518	**Process_data_sheet**	An Information_content (see 4.2.98) that specifies process design conditions. These include the classification of the Process_material (see 4.2.136) and the Properties (see 4.2.137) of the Process_material.

M.4.2 Specified instances of Class_of_information_content for identification

Specified instances of Class_of_information_content relevant to identification are defined in table M.15.

Table M.15 – Specified instances of Class_of_information_content for identification

inst.	name	definition
519	**Label**	A Text (see 4.2.171) that identifies an object, that is intended to be used by people, but that does not necessarily consist of words which have meaning in a natural language.
NOTES 1 – A tag for a Facility (see 4.2.89) is a Label. 2 – A Label may be further classified by the identification scheme that has been used to create it by a Classification_of_information_content (see 4.2.39). EXAMPLES 265 – The Label 'V1a' is the tag for a Facility in the example in annex L. 266 – The report identifier 'CISD/DJL/1234' is a Label.		
520	**Name**	A Text (see 4.2.171) that identifies an object, that is intended to be used by people, and that consists of words which have meaning in a natural language.
NOTE – The title of a report is a Name. EXAMPLES 267 – 'Boiler feed water pump' is a Name for a Class_of_facility (see 4.2.26). 268 – 'Boiler feed water pump No.2 of unit 1 of Much Binding B' is a Name of a Facility (see 4.2.89).		
521	**Sheet_number**	A Label (see annex M, instance 519) that is the number of a Drawing_sheet (see annex M, instance 1215).
522	**Sheet_title**	A Name (see annex M, instance 520) that is the title of a Drawing_sheet (seeannex M, instance 1215).

M.4.3 Specified instances of Class_of_information_content for natural language

Specified instances of Class_of_information_content relevant to natural languages are defined in table M.16.

Table M.16 – Specified instances of Class_of_information_content for natural language

inst.	name	definition
523	**Chinese**	A Text (see 4.2.171) that is Chinese language (Mandarin).
524	**Dutch**	A Text (see 4.2.171) that is Dutch language.
525	**English**	A Text (see 4.2.171) that is English language.
526	**French**	A Text (see 4.2.171) that is French language.
527	**German**	A Text (see 4.2.171) that is German language.
528	**Japanese**	A Text (see 4.2.171) that is Japanese language.
529	**Spanish**	A Text (see 4.2.171) that is Spanish language.

M.5 Specified instances of Class_of_involvement

The specified instances of Class_of_involvement (see 4.2.29) are defined in table M.17.

NOTES

1 – Each instance of the AIM entity **standard_class_of_involvement** (see 5.2.3.157) has a **name** attribute inherited from **group**.

This attribute is one of the keywords listed in the 'name' column of the table in clause M.5 and indicates the corresponding specified instance of Class_of_involvement.

2 – A Class_of_involvement indicates the nature of an Involvement_of_object_in_activity (see 4.2.103). Each specified instance of Class_of_involvement is defined by the nature of an Involvement_of_object_in_activity that is so classified.

Table M.17 – Specified instances of Class_of_involvement

inst.	name	definition
530	**Assessed_object**	An Involvement_of_object_in_activity (see 4.2.103) that is being assessed for fitness for purpose by an Assess (see annex M, instance 1) Activity.
531	**Assessment_purpose**	An Involvement_of_object_in_activity (see 4.2.103) that is being the purpose for which fitness is assessed by an Assess (see annex M, instance 1) Activity.
NOTE – Only an Activity or a Class_of_activity may be involved as an Assessment_purpose.		
532	**Assessment_result**	An Involvement_of_object_in_activity (see 4.2.103) that is being the result of an Assess (see annex M, instance 1) Activity.
NOTE – The object that is involved as an Assessment_result is usually the Beginning_or_end_effect (see 4.2.21) of an Approval_of_object (see 4.2.16).		
533	**Input_material**	An Involvement_of_object_in_activity (see 4.2.103) that is being a Material (see 4.2.110) input to an Activity.
NOTE – The Activity may be a Transform_material (see annex M, instance 4).		
534	**Material_destination**	An Involvement_of_object_in_activity (see 4.2.103) that is being a destination for the Material (see 4.2.110) subject to an Activity.
NOTES 1 – The destination of Material may be a Facility (see 4.2.89). 2 – The Activity may be a Transfer_material (see annex M, instance 3).		

Table M.17 – Specified instances of Class_of_involvement (concluded)

inst.	name	definition
535	**Material_source**	An Involvement_of_object_in_activity (see 4.2.103) that is being a source for the Material (see 4.2.110) subject to an Activity.
NOTES 1 – The source of Material may be a Facility (see 4.2.89). 2 – The Activity may be a Transfer_material (see annex M, instance 3).		
536	**Output_material**	An Involvement_of_object_in_activity (see 4.2.103) that is being a Material (see 4.2.110) output from an Activity.
NOTE – The Activity may be a Transform_material (see annex M, instance 4).		
537	**Performer**	An Involvement_of_object_in_activity (see 4.2.103) that is performing the Activity.
NOTE – An Activity may be performed by a Person (see 4.2.122), Organization (see 4.2.114), Facility (see 4.2.89) or Material (see 4.2.110).		
538	**Referenced_in_design**	An Involvement_of_object_in_activity (see 4.2.103) that is being referenced by a Design (see annex M, instance 2) Activity.
539	**Result_of_design**	An Involvement_of_object_in_activity (see 4.2.103) that is being the result of a Design (see annex M, instance 2) Activity.
540	**Transferred_material**	An Involvement_of_object_in_activity (see 4.2.103) that is being a Material (see 4.2.110) transferred by an Activity.
NOTE – The Activity may be a Transfer_material (see annex M, instance 3).		

M.6 Specified instances of Class_of_material

The specified instances of Class_of_material (see 4.2.30) are given in tables in clause M.6.

NOTES

1 – Each instance of the AIM entity **standard_class_of_material** (see 5.2.3.158) has a **name** attribute inherited from **group**.

This attribute is either:

- one of the keywords listed in the 'name' column of the tables in clause M.6 and indicates the corresponding specified instance of Class_of_material; or
- one of the text strings listed in the 'name' column of the tables in clause M.8 and indicates the corresponding specified instance of Class_of_substance.

2 – The specified instances of Class_of_material are grouped into tables according to engineering discipline.

M.6.1 Specified instances of Class_of_material for generic classification

Specified instances of Class_of_material that are not specific to an engineering discipline are defined in table M.18.

Table M.18 – Specified instances of Class_of_material for generic classification

inst.	name	definition
541	**Bill_of_materials**	A Material_collection (see annex M, instance 546) that defines the complete set of Material objects within a scope.
542	**Connector**	A Material (see 4.2.110) that connects two or more other Material objects.
543	**Enclosure**	A Material (see 4.2.110) that encloses space, that may or may not contain other Material.
544	**Material_assembly**	A Material (see 4.2.110) that is an assembly of two or more other Material objects.
NOTE – The term 'assembly' is defined in 3.5.2.		
545	**Material_catalogue**	A Material_collection (see annex M, instance 546) that supports the selection of members of the collection.

Table M.18 – Specified instances of Class_of_material for generic classification (concluded)

inst.	name	definition
546	**Material_collection**	A Material (see 4.2.110) that is a collection of two or more other Material objects.
NOTE – The term 'collection' is defined in 3.5.5.		

M.6.2 Specified instances of Class_of_material for heat transfer

Specified instances of Class_of_material relevant to Heat_transfer_equipment (see annex M, instance 560) are defined in table M.19.

Table M.19 – Specified instances of Class_of_material for heat transfer

inst.	name	definition
547	**Double_pipe_heat_-exchanger**	A Heat_transfer_equipment (see annex M, instance 560) that is designed for use as a Heat_exchanger (see annex M, instance 57) and that consists one or more Pipes (see annex M, instance 707) placed concentrically inside larger pipes. The inner Pipes may be plain or finned.
548	**Fin_tube_air_preheater**	A Heat_transfer_equipment (see annex M, instance 560) that is designed for use as an Air_preheater (see annex M, instance 41) and that has a heat transfer area enlarged by Fins (see annex M, instance 597) on the outside of the Tubes (see annex M, instance 621).
549	**Fin_tube_heat_exchanger**	A Heat_transfer_equipment (see annex M, instance 560) that is designed for use as a Heat_exchanger (see annex M, instance 57) and that has a heat transfer area enlarged by Fins (see annex M, instance 597) on the outside of the Tubes (see annex M, instance 621).
550	**Fixed_tube_sheet_heat_-exchanger**	A Shell_and_tube_heat_exchanger (see annex M, instance 577) that has Tube_sheets (see annex M, instance 622) that are not moveable.
551	**Flame_pipe_boiler**	A Heat_transfer_equipment (see annex M, instance 560) that is designed for use as a Boiler (see annex M, instance 42) and as a Fired_heat_transfer_system (see annex M, instance 52) and has flames in the Pipes and the liquid surrounding the Pipes.
552	**Floating_head_heat_-exchanger**	A Shell_and_tube_heat_exchanger (see annex M, instance 577) that has one Tube_sheet (see annex M, instance 622) fixed and the other floating.

Table M.19 – Specified instances of Class_of_material for heat transfer (continued)

inst.	name	definition
553	**Forced_down_draught_-furnace**	A Forced_draught_furnace (see annex M, instance 555) that has a downward direction of gas flow.
554	**Forced_draught_air_-cooler**	A Heat_transfer_equipment (see annex M, instance 560) that is designed for use as an Air_cooler (see annex M, instance 39) and that uses mechanical energy to force air flow.
555	**Forced_draught_furnace**	A Heat_transfer_equipment (see annex M, instance 560) that is designed for use as a Furnace (see annex M, instance 56) and that uses mechanical energy to force air flow.
556	**Forced_up_draught_-furnace**	A Forced_draught_furnace (see annex M, instance 555) that has an upward direction of gas flow.
557	**Graphite_cubic_block_-heat_exchanger**	A Graphite_heat_exchanger (see annex M, instance 558) that contains perforated blocks of graphite.
558	**Graphite_heat_exchanger**	A Heat_transfer_equipment (see annex M, instance 560) that is designed for use as a Heat_exchanger (see annex M, instance 57) and that has graphite as the construction material (see 3.5.8).
559	**Hairpin_heat_exchanger**	A Shell_and_tube_heat_exchanger (see annex M, instance 577) that has Tubes (see annex M, instance 621) that have a bend through 180 degrees in the middle and have both ends fastened to the same Tube_sheet (see annex M, instance 622).
560	**Heat_transfer_equipment**	A Mechanical_equipment (see annex M, instance 754) that is designed for use as a Heat_transfer_system (see annex M, instance 58).
561	**Horizontal_furnace**	A Heat_transfer_equipment (see annex M, instance 560) that is designed for use as a Furnace (see annex M, instance 56) and that is enclosed in a vessel with a horizontal axis.
562	**Horizontal_heat_-transfer_equipment**	A Heat_transfer_equipment (see annex M, instance 560) that is enclosed in a vessel with a horizontal axis.
563	**Induced_draught_air_-cooler**	A Heat_transfer_equipment (see annex M, instance 560) that is designed for use as an Air_cooler (see annex M, instance 39) and is such that air is forced through.
564	**Induced_draught_furnace**	A Heat_transfer_equipment (see annex M, instance 560) that is designed for use as a Furnace (see annex M, instance 56) and is such that air is forced through.

Table M.19 – Specified instances of Class_of_material for heat transfer (continued)

inst.	name	definition
565	**Kettle_reboiler**	A Horizontal_heat_transfer_equipment (see annex M, instance 562) that is designed for use as a Reboiler (see annex M, instance 62) and that has a separate vapour space.
566	**Natural_draught_air_-cooler**	A Heat_transfer_equipment (see annex M, instance 560) that is designed for use as an Air_cooler (see annex M, instance 39) and is such that air flow is caused by density differential.
567	**Natural_draught_furnace**	A Heat_transfer_equipment (see annex M, instance 560) that is designed for use as a Furnace (see annex M, instance 56) and is such that gas flow is caused by density differential.
568	**Nipple**	A Nozzle (see annex M, instance 569) that is small.
569	**Nozzle**	A Material (see 4.2.110) that projects from a container of fluid and that is designed for use as a Fluid_port (see annex M, instance 24).
NOTE – A Nozzle may be designed for the connection of Piping (see annex M, instance 715) but need not be.		
570	**Plate_and_frame_heat_-exchanger**	A Plate_heat_exchanger (see annex M, instance 573) that has the plates mounted in a frame.
571	**Plate_and_shell_heat_-exchanger**	A Plate_heat_exchanger (see annex M, instance 573) that has Corrugated_plates (see annex M, instance 592) packed in a pressure vessel.
572	**Plate_fin_heat_exchanger**	A Plate_heat_exchanger (see annex M, instance 573) that contains Flat_plates (see annex M, instance 599) separated by U-shaped Fins (see annex M, instance 597).
573	**Plate_heat_exchanger**	A Heat_transfer_equipment (see annex M, instance 560) that is designed for use as a Heat_exchanger (see annex M, instance 57) and that contains plates to separate the fluids.
574	**Plate_type_air_preheater**	A Heat_transfer_equipment (see annex M, instance 560) that is designed for use as an Air_preheater (see annex M, instance 41) and that contains plates to separate the fluids.
575	**Shell_and_tube_-condenser**	A Shell_and_tube_heat_exchanger (see annex M, instance 577) that is designed for use as a Condenser (see annex M, instance 44).

Table M.19 – Specified instances of Class_of_material for heat transfer (concluded)

inst.	name	definition
576	**Shell_and_tube_cooler**	A Shell_and_tube_heat_exchanger (see annex M, instance 577) that is designed for use as a Cooler (see annex M, instance 45).
577	**Shell_and_tube_heat_-exchanger**	A Heat_transfer_equipment (see annex M, instance 560) that is designed for use as a Heat_exchanger (see annex M, instance 57) and that has a Tube Bundle (see annex M, instance 588) inside a Shell (see annex M, instance 1181) to create a sufficient heat transfer area.
578	**Surface_condenser**	A Heat_transfer_equipment (see annex M, instance 560) that is designed for use as a Condenser (see annex M, instance 44) and that has vertical Plates (see annex M, instance 610) to separate condensate from vapour flow.
579	**Thermosyphon_reboiler**	A Vertical_reboiler (see annex M, instance 582) that uses density differential between liquid and boiling liquid as the driving force for fluid flow.
580	**Vertical_furnace**	A Heat_transfer_equipment (see annex M, instance 560) that is designed for use as a Furnace (see annex M, instance 56) and that is enclosed in a vessel with a vertical axis.
581	**Vertical_heat_transfer_-equipment**	A Heat_transfer_equipment (see annex M, instance 560) that is enclosed in a vessel with a vertical axis.
582	**Vertical_reboiler**	A Vertical_heat_transfer_equipment (see annex M, instance 581) that is designed for use as a Reboiler (see annex M, instance 62).
583	**Water_pipe_boiler**	A Heat_transfer_equipment (see annex M, instance 560) that is designed for use as a Boiler (see annex M, instance 42) and has Pipes (see annex M, instance 707) containing the water to be boiled.

M.6.3 Specified instances of Class_of_material for heat transfer equipment components

Specified instances of Class_of_material relevant to Heat_transfer_equipment (see annex M, instance 560) components are defined in table M.20.

A Material classified by one of these instances of Class_of_Material is a component of a Heat_transfer_equipment or a component associated with a Heat_transfer_equipment.

NOTE – Some of the instances of Class_of_material in this table are defined in terms of the role played by a component or by its position in an assembly.

Table M.20 – Specified instances of Class_of_material for heat transfer equipment components

inst.	name	definition
584	**Backing_device**	A Heat_exchanger_component (see annex M, instance 604) that supports the floating head cover flange to the floating Tube_sheet (see annex M, instance 622).
585	**Baffle**	A Vessel_internal (see annex M, instance 1203) that is a plate designed to guide Process_material (see 4.2.136) along a path within a Vessel (see annex M, instance 1113).
NOTE – A Baffle may also support Tubes (see annex M, instance 621),		
586	**Bonnet**	A Heat_exchanger_component (see annex M, instance 604) that separates the inlet and outlet flows of fluid for a Shell_and_tube_heat_exchanger (see annex M, instance 577).
587	**Bracket**	A Support (see annex M, instance 1189) that supports small Equipment (see annex M, instance 751).
588	**Bundle**	A Heat_exchanger_component (see annex M, instance 604) that is an assembly of Tubes (see annex M, instance 621), one or more Baffles (see annex M, instance 585), and other Heat_exchanger_components.
589	**Coil**	A Bent_pipe (see annex M, instance 676) that that transports heating or cooling fluid through a Vessel (see annex M, instance 1113) or around its wall in order to transfer heat in to or out of another fluid.
NOTE – A Coil usually has a helical shape.		
590	**Concrete_insulation**	A Refractory_lining (see annex M, instance 1177) that is made of concrete.

Table M.20 – Specified instances of Class_of_material for heat transfer equipment components (continued)

inst.	name	definition
591	**Connection_packing_-assembly**	A Material_assembly (see annex M, instance 544) that is a set of components involved in a connection and that contains Packing (see annex M, instance 980).
592	**Corrugated_plate**	A Plate (see annex M, instance 610) that has a corrugated shape.
593	**Embedded_finned_tube**	A Finned_tube (see annex M, instance 598) that has the fin embedded in the Tube (see annex M, instance 621).
594	**Equipment_component**	A Material (see 4.2.110) that is designed to be part of an Equipment (see annex M, instance 751).
595	**Expansion_joint**	A Connector (see annex M, instance 542) that is designed to absorb thermal expansion.
NOTE – An Expansion_joint may also absorb mechanical vibration.		
596	**Ferrel_tube_connector**	A Seal (see annex M, instance 971) that is designed to seal a tube into a fixed Tube_sheet (see annex M, instance 622) while allowing thermal expansion.
597	**Fin**	A Material (see 4.2.110) that is a thin plate attached to a Tube (see annex M, instance 621) or other Material in order to increase its surface area.
598	**Finned_tube**	A Tube (see annex M, instance 621) that has Fins (see annex M, instance 597) attached to the outside.
599	**Flat_plate**	A Plate (see annex M, instance 610) that is flat.
600	**Floating_head**	A Head (see annex M, instance 603) that can move inside a Heat_exchanger (see annex M, instance 57).
601	**Floating_tubesheet**	A Tube_sheet (see annex M, instance 622) that can move inside a Shell (see annex M, instance 1181).
602	**Front_end_head**	A Head (see annex M, instance 603) that is located at the front end of a Heat_exchanger (see annex M, instance 57).
603	**Head**	A Cover (see annex M, instance 879) that closes a Shell (see annex M, instance 1181).
604	**Heat_exchanger_-component**	A Material (see 4.2.110) that is designed to be be part of a Heat_exchanger (see annex M, instance 57).
605	**Heat_exchanger_shell**	A Shell (see annex M, instance 1181) that is part of a Heat_-exchanger (see annex M, instance 57).

Table M.20 – Specified instances of Class_of_material for heat transfer equipment components (continued)

inst.	name	definition
606	**Impingement_plate**	A Plate (see annex M, instance 610) that absorbs the impulse of a fluid.
607	**Integral_finned_tube**	A Finned_tube (see annex M, instance 598) that is made of one piece of material.
608	**Longitudinal_baffle**	A Baffle (see annex M, instance 585) that lies in a plane parallel to the Tubes (see annex M, instance 621).
609	**Pass_partition_plate**	A Plate (see annex M, instance 610) that partitions a Shell_and_tube_heat_exchanger (see annex M, instance 577) into passes.
610	**Plate**	An Equipment_component (see annex M, instance 594) that is a sheet of metal or other material.
611	**Ring**	An Equipment_component (see annex M, instance 594) that has the shape of a torus.
612	**Shell_cover**	A Cover (see annex M, instance 879) that covers a Shell (see annex M, instance 1181).
613	**Shell_cover_flange**	A Material (see 4.2.110) that is a flange welded to a Shell (see annex M, instance 1181) Cover (see annex M, instance 879).
614	**Shell_rear_head_end_flange**	A Material (see 4.2.110) that is a flange welded to a rear end Head (see annex M, instance 603) of a Shell (see annex M, instance 1181).
615	**Shell_stationary_head_end_flange**	A Material (see 4.2.110) that is a flange welded to a stationary end Head (see annex M, instance 603) of a Shell (see annex M, instance 1181).
616	**Stationary_head**	A Head (see annex M, instance 603) that cannot move inside a Heat_exchanger (see annex M, instance 57).
617	**Stationary_head_nozzle**	A Nozzle (see annex M, instance 569) that is mounted on a Stationary_head (see annex M, instance 616).
618	**Sump**	An Equipment that collects the heavier phase.
619	**Support_plate**	A Plate (see annex M, instance 610) that supports a Tube Bundle (see annex M, instance 588).

Table M.20 – Specified instances of Class_of_material for heat transfer equipment components (concluded)

inst.	name	definition
620	**Transverse_baffle**	A Baffle (see annex M, instance 585) that lines in a plane orthogonal to the Tubes (see annex M, instance 621).
621	**Tube**	A Pipe (see annex M, instance 707) that is manufactured to strict dimensional tolerances, especially the outside diameter.
622	**Tube_sheet**	A Heat_exchanger_component (see annex M, instance 604) that bears Tubes (see annex M, instance 621) and that isolates the shell side from the tube side in a Shell_and_tube_heat_exchanger (see annex M, instance 577).
623	**Tube_spacer**	A Material (see 4.2.110) that is designed to ensure a proper space between Tubes (see annex M, instance 621) in a Bundle (see annex M, instance 588).
624	**Weir**	An Equipment (see annex M, instance 751) that is a barrier to the flow of liquid, and that is designed to allow an overflow.

M.6.4 Specified instances of Class_of_material for instrumentation and control

Specified instances of Class_of_material that are relevant to instrumentation and control are defined in table M.21.

Table M.21 – Specified instances of Class_of_material for instrumentation and control

inst.	name	definition
625	**Air_set**	A Material_assembly (see annex M, instance 544) that is of control components for Instrument (see annex M, instance 140) air.
626	**Bourdon_tube**	An Equipment (see annex M, instance 751) that is designed for use as a Pressure_sensor (see annex M, instance 192) and that consists of a bent Pipe (see annex M, instance 707) that straightens when subject to internal pressure.
627	**Cabinet**	An Enclosure (see annex M, instance 543) that holds and protects electrical components.
628	**Chromatograph**	An Equipment (see annex M, instance 751) that is designed for use as an Analyser (see annex M, instance 76) and that uses chromatography to determine the molecular composition of a substance.
629	**Coriolis_meter**	An In_line_measuring_device (see annex M, instance 631) that is designed for use as a Flow_meter (see annex M, instance 122), and that is based upon the coriolis principle.
630	**Differential_pressure_-flow_meter**	An Equipment (see annex M, instance 751) that is designed for use as a Flow_meter (see annex M, instance 122) and is base upon the principle of differential pressure measurement.
631	**In_line_measuring_device**	An Equipment (see annex M, instance 751) that is designed for use as a Measuring_device (see annex M, instance 163) located between two Piping_components (see annex M, instance 717).

Table M.21 – Specified instances of Class_of_material for instrumentation and control (continued)

inst.	name	definition
632	**Infra_red_analyser**	An Equipment (see annex M, instance 751) that is designed for use as an Analyser (see annex M, instance 76) and that uses the absorption of infra-red light to determine chemical composition.
633	**Infra_red_detector**	An Equipment (see annex M, instance 751) that is designed for use as an Automatic_detector (see annex M, instance 78) and that uses the absorption of infra-red light to detect the presence of a chemical.
634	**Magnetic_flow_meter**	An In_line_measuring_device (see annex M, instance 631) that is designed for use as a Flow_meter (see annex M, instance 122) and that applies the principle of magnetic fields.
635	**Manometer**	An Equipment (see annex M, instance 751) that is designed for use as a Pressure_gauge (see annex M, instance 188) and that applies the principle of pressure differential.
636	**Orifice_assembly**	A Material_assembly (see annex M, instance 544) that is designed for use as an Instrument (see annex M, instance 140) and that contains an orifice as a main component.
637	**Orifice_flow_meter**	An Orifice_assembly (see annex M, instance 636) that is designed for use as a Flow_meter (see annex M, instance 122) and that uses an orifice as the primary Measuring_or_sensing_element (see annex M, instance 661).
638	**Orifice_plate**	A Plate (see annex M, instance 610) that has a hole to create a pressure drop in a flowing fluid.
639	**Panel_instrument**	An Equipment (see annex M, instance 751) that is designed for use as an Instrument (see annex M, instance 140) and that has a special shape for mounting on a control panel.
640	**Pitot_tube_flow_meter**	An Equipment (see annex M, instance 751) that is designed for use as a Flow_meter (see annex M, instance 122) and that has a pitot tube as the primary Measuring_or_sensing_element (see annex M, instance 661).
641	**Positive_displacement_flow_meter**	An Equipment (see annex M, instance 751) that is designed for use as a Flow_meter (see annex M, instance 122) and that applies the principle of positive displacement.

Table M.21 – Specified instances of Class_of_material for instrumentation and control (continued)

inst.	name	definition
642	**Rotameter**	An Equipment (see annex M, instance 751) that is designed for use as a Flow_meter (see annex M, instance 122) and that consists of plug within a vertical Pipe. The Pipe has a cross section that increases with height, so that a flow of fluid up the Pipe raises the plug by a distance dependent upon the flow rate.
643	**Sight_glass**	An Equipment (see annex M, instance 751) that is intended for use as a Level_gauge (see annex M, instance 148) and that consists of a transparent Pipe within which a liquid level is visible.
644	**Thermocouple**	An Equipment (see annex M, instance 751) that is designed for use as a Temperature_measuring_device (see annex M, instance 226) and that contains a junction between two dissimilar metals. A potential is generated by the junction that depends upon the temperature.
645	**Touch_button**	An Equipment (see annex M, instance 751) that is intended for use as a Manual_switch (see annex M, instance 162) and that switches when a button is touched.
646	**Turbine_meter**	An In_line_measuring_device (see annex M, instance 631) that is designed for use as a Flow_meter (see annex M, instance 122) and that contains a rotor as the primary Measuring_or_sensing_element (see annex M, instance 661).
647	**U-tube_manometer**	A Manometer (see annex M, instance 635) that has a U-tube.
648	**Ultrasonic_transmitter**	An Equipment (see annex M, instance 751) that is designed for use as a generator of ultrasonic signals for testing or measurement.
649	**Ultra_violet_detector**	An Equipment (see annex M, instance 751) that is designed for use as a Detector (see annex M, instance 93) and that that applies the principle of ultra violet detection.
650	**Ultrasonic_flow_meter**	An In_line_measuring_device (see annex M, instance 631) and an Ultrasonic_meter (see annex M, instance 651) that is designed for use as a Flow_meter (see annex M, instance 122).

Table M.21 – Specified instances of Class_of_material for instrumentation and control (concluded)

inst.	name	definition
651	**Ultrasonic_meter**	An Equipment (see annex M, instance 751) that is designed for use as a Meter (see annex M, instance 165) and that applies the principle of time delay of an ultrasonic signal.
652	**Vortex_meter**	An In_line_measuring_device (see annex M, instance 631) that is designed for use as a Flow_meter (see annex M, instance 122) and that applies the principle of a vortex.
653	**Vibration_connector**	A Connector (see annex M, instance 542) that transmits mechanical vibration.

M.6.5 Specified instances of Class_of_material for instrumentation and control components

Specified instances of Class_of_material relevant to instrumentation and control components are defined in table M.22.

A Material classified by one of these instances of Class_of_Material is a component of a Material that has an instrumentation or control function or a component associated with such a Material.

NOTE – Some of the instances of Class_of_material in this table are defined in terms of the role played by a component or by its position in an assembly.

Table M.22 – Specified instances of Class_of_material for instrumentation and control components

inst.	name	definition
654	**Analyser_component**	A Material (see 4.2.110) that is part of an Analyser (see annex M, instance 76).
655	**Electronic_system_-component**	A Material (see 4.2.110) that is designed for processing electronic signals.
656	**Flow_measuring_element**	A Measuring_or_sensing_element (see annex M, instance 661) that senses flow of a fluid.
657	**Frame**	A Material (see 4.2.110) that is designed to have other Materials mounted on it.
658	**In_line_body**	A Valve_body (see annex M, instance 1080) that is also an In_-line_element (see annex M, instance 659).
659	**In_line_element**	A Instrument_component (see annex M, instance 660) that is designed to be located between two Piping_components (see annex M, instance 717).
660	**Instrument_component**	A Material (see 4.2.110) that is designed to be part of an assembly used as an Instrument (see annex M, instance 140).
661	**Measuring_or_sensing_-element**	A Material (see 4.2.110) that is designed to be used as the primary element measuring or sensing a process condition and producing a signal. Measuring produces a signal that varies with the process condition, whereas sensing may merely detect a threshold level.
662	**Paper_drive**	A Instrument_component (see annex M, instance 660) that is designed to move paper in a recorder at a constant speed.

Table M.22 – Specified instances of Class_of_material for instrumentation and control components (concluded)

inst.	name	definition
663	**Pneumatic_component**	A Instrument_component (see annex M, instance 660) that is designed to be used within a Pneumatic_system (see annex M, instance 184).
NOTE – The gas within a Pneumatic_system is usually air.		
664	**Pressure_sensing_element**	A Measuring_or_sensing_element (see annex M, instance 661) that senses pressure.
665	**Probe**	A Material (see 4.2.110) that is designed to be inserted into a substance to determine the nature of a substance, or its properties.
666	**Rack**	A Frame (see annex M, instance 657) that is designed to contain cards.
667	**Sample_probe**	A Probe (see annex M, instance 665) that allows a sample to be taken at the right location.
668	**Temperature_measuring_element**	A Temperature_sensing_element (see annex M, instance 669) that is used to make a measurement.
669	**Temperature_sensing_element**	A Measuring_or_sensing_element (see annex M, instance 661) that is used to sense a temperature.
670	**Venturi**	A Flow_measuring_element (see annex M, instance 656) that applies the venturi principle.
671	**Venturi_tube**	A Venturi (see annex M, instance 670) that is an enclosed tube with a venturi shape.
672	**Wetted_part**	A Instrument_component (see annex M, instance 660) that is designed for use in direct contact with the Process_material (see 4.2.136).

M.6.6 Specified instances of Class_of_material for piping and insulation

Specified instances of Class_of_material relevant to piping and insulation are defined in tables M.23.

Table M.23 – Specified instances of Class_of_material for piping and insulation

inst.	name	definition
673	**Articulated_bellow**	A Bellow (see annex M, instance 675) that connects Piping_-components (see annex M, instance 717) with different centre lines.
674	**Basket_filter**	A Piping_component (see annex M, instance 717) that is designed for use as a Filter (see annex M, instance 248) and that has a basket to contain the particles removed from the fluid.
675	**Bellow**	A Piping_component (see annex M, instance 717) that connects other Piping_components and allows relative displacement of the connected components.
676	**Bent_pipe**	A Pipe (see annex M, instance 707) that contains one or more bends and that is formed from Straight_pipe (see annex M, instance 738) on site.
677	**Blind_flange**	A Pipe_flange (see annex M, instance 710) that has no opening to allow the passage of fluid.
678	**Bottom_flat_eccentric_-reducer**	An Eccentric_reducer (see annex M, instance 690) that has an offset between the centre lines of the two Pipes equal to the difference between the radii of the two Pipes. A Bottom_flat_eccentric_reducer is intended to be installed such that the bottoms of the two Pipes are at the same level.
NOTE – A Bottom_flat_eccentric_reducer is also called a 'Top_flat_eccentric_reducer' if it is intended to be installed the other way up. The Material object in the two cases is identical.		
679	**Butt_weld_flange**	A Pipe_flange (see annex M, instance 710) that is suitable for a butt weld.
680	**Cap**	A Piping_terminator (see annex M, instance 720) that has a hole into which the capped Pipe (see annex M, instance 707) is inserted.

Table M.23 – Specified instances of Class_of_material for piping and insulation (continued)

inst.	name	definition
681	**Capillary_tube**	A Pipe (see annex M, instance 707) that has a sufficiently small internal diameter to move fluid by surface tension.
682	**Cartridge_filter**	A Piping_component (see annex M, instance 717) that is designed for use as a Filter (see annex M, instance 248) and that has cartridge paper to remove particle from the fluid.
683	**Coating**	A Protection_material (see annex M, instance 722) that protects a surface either from the environment or from a Process_material (see 4.2.136).
684	**Concentric_reducer**	A Reducer (see annex M, instance 724) that that inlet and outlet have the same centre line.
685	**Cross_pipe_junction**	A Pipe_fitting (see annex M, instance 711) that connects four Pipes in the form of a cross.
686	**Delta_ring_flange**	A Pipe_flange (see annex M, instance 710) that has a groove to accept a delta ring.
687	**Drain_assembly**	A Piping_assembly (see annex M, instance 716) that is designed for use connecting a Drainage_system (see annex M, instance 296) to a container that may be drained.
NOTE – A Drain_assembly often consists of a Drain_funnel (see annex M, instance 688), a Valve (see annex M, instance 1063) and a Pipe (see annex M, instance 707).		
688	**Drain_funnel**	A Piping_component (see annex M, instance 717) that is designed for use as a collector of drained liquid and that is a funnel open to the atmosphere.
689	**Duplex_filter**	A Piping_component (see annex M, instance 717) that is designed for use as a Filter (see annex M, instance 248) and that has a built in spare collector of particles for use when the primary collector is clogged.
690	**Eccentric_reducer**	A Reducer (see annex M, instance 724) that has an inlet and outlet with different centre lines.
691	**Elbow**	A Pipe_fitting (see annex M, instance 711) that connects two Pipes with different but intersecting centre lines.
692	**Elbowlet**	An Olet (see annex M, instance 706) that connects a Pipe to an Elbow.
693	**Flat_face_flange**	A Pipe_flange (see annex M, instance 710) that has a flat face finished over the whole area of the joint.

Table M.23 – Specified instances of Class_of_material for piping and insulation (continued)

inst.	name	definition
694	**Flexible_hose**	A Pipe (see annex M, instance 707) that can be bent as required whilst in service.
695	**Hub_flange**	A Pipe_flange (see annex M, instance 710) that has a low hub or boss which may be a screw type or socket welding type.
696	**Lap_joint_flange**	A Pipe_flange (see annex M, instance 710) that has an overlapping part.
697	**Lap_joint_flange_-connection**	A Piping_assembly (see annex M, instance 716) that makes a connection and that includes a Lap_joint_flange (see annex M, instance 696).
698	**Lapped_flange**	A Pipe_flange (see annex M, instance 710) that holds stub ends of dissimilar construction material by overlapping them. It differs from a Lap_joint_flange (see annex M, instance 696) by having a recess in the faced end so that the stub end does not protrude past the face.
699	**Lateral_pipe_junction**	A Pipe_fitting (see annex M, instance 711) that connects three pipes. Two of the pipes have the same centre line and form a straight run. The third pipe has a centre line that intersects the centre line of the other two and forms a branch outlet. The branch outlet diverges from the main run at an angle significantly less that 90 degrees, and usually at 45 degrees.
700	**Lens_ring_flange**	A Pipe_flange (see annex M, instance 710) that has a lens ring clamped and fastened to it.
701	**Male_female_flange**	A Pipe_flange (see annex M, instance 710) that has joint surfaces with male and female shapes for coupling.
702	**Mechanical_steam_trap**	A Piping_component (see annex M, instance 717 that is designed for use as a Steam_trap (see annex M, instance 273) and operates mechanically.
703	**Mitre_bend**	A Pipe_bend (see annex M, instance 708) that is an assembly of straight segments.
704	**Multiple_basket_filter**	A Basket_filter (see annex M, instance 674) that has more than one basket.

Table M.23 – Specified instances of Class_of_material for piping and insulation (continued)

inst.	name	definition
705	**O_ring_flange**	A Pipe_flange (see annex M, instance 710) that has a groove to accept an O_ring (see annex M, instance 951).
706	**Olet**	A Pipe_fitting (see annex M, instance 711) that is welded around a hole in a Pipe (see annex M, instance 707) or other Pipe_fitting (see annex M, instance 711).
707	**Pipe**	A Piping_component (see annex M, instance 717) that is hollow and approximately cylindrical; that may have a constant cross-section along its length.
NOTES 1 – A Pipe may convey fluid, vapour, or particulate matter. 2 – The term 'pipe' is defined in 3.5.18.		
708	**Pipe_bend**	A Pipe (see annex M, instance 707) that is a single pre-fabricated bend.
NOTE – A Pipe_bend can change the direction of a Pipe without the use of a Pipe_fitting (see annex M, instance 711).		
709	**Pipe_coupling**	A Pipe_fitting (see annex M, instance 711) that allows the connection or disconnection of two Pipes that have the same centre line.
710	**Pipe_flange**	A Piping_component (see annex M, instance 717) that is flat on one side and that makes a removable connection.
711	**Pipe_fitting**	A Piping_component (see annex M, instance 717) that enables: – a change in the centre line axis a Pipe – a change in the diameter of a Pipe; (see annex M, instance 707); – a branch to be made from the main run of a Pipe; or – a connection or disconnection of two Pipes.
712	**Pipe_neck**	A Piping_component (see annex M, instance 717) that makes room for welding.

Table M.23 – Specified instances of Class_of_material for piping and insulation (continued)

inst.	name	definition
713	**Pipe_support**	A Piping_component (see annex M, instance 717) that provides structural support to other Piping_components (see annex M, instance 717).
714	**Pipe_support_clip**	A Clip (see annex M, instance 1132) that is designed to fasten a Pipe (see annex M, instance 707) to a Pipe_support (see annex M, instance 713).
715	**Piping**	A Material_collection (see annex M, instance 546) that is a collection of Piping_components (see annex M, instance 717).
716	**Piping_assembly**	A Material_assembly (see annex M, instance 544) that is an assembly of Piping_components.
717	**Piping_component**	A Material (see 4.2.110) that is designed for use as a part of a Piping_system (see annex M, instance 335).
718	**Piping_specification**	A Material_catalogue (see annex M, instance 545) that is a catalogue of typical Piping_components valid for specific process conditions.
719	**Piping_spool**	A Piping_assembly (see annex M, instance 716) that is fabricated as a single item.
720	**Piping_terminator**	A Piping_component that closes an open end of a Pipe (see annex M, instance 707).
721	**Plug**	A Pipe_fitting (see annex M, instance 711) that fits to a hole or into the bore of a Pipe (see annex M, instance 707) to stop the flow of fluid.
722	**Protection_material**	A Material (see 4.2.110) that provides protection against damage caused by the environment or by Process_material (see 4.2.136).
723	**Raised_face_flange**	A Pipe_flange (see annex M, instance 710) that has a circular raised face.
724	**Reducer**	A Pipe_fitting (see annex M, instance 711) that connects two Pipes of different diameters with the same centre line or parallel centre lines.
725	**Ring_joint_gasket_flange**	A Pipe_flange (see annex M, instance 710) that has a groove to accept a ring joint gasket.
726	**Rotary_belt_filter**	A Piping_component (see annex M, instance 717) that is designed for use as a Filter (see annex M, instance 248) and that has a rotating belt.

Table M.23 – Specified instances of Class_of_material for piping and insulation (continued)

inst.	name	definition
727	**Rotary_drum_filter**	A Piping_component (see annex M, instance 717) that is designed for use as a Filter (see annex M, instance 248) and that has a perforated rotating drum covered by a filter sheet.
728	**Screen**	A Piping_component (see annex M, instance 717) that is designed for use as a Filter (see annex M, instance 248) and consists of rigid Material in a plane perpendicular to the direction of flow.
729	**Single_basket_filter**	A Basket_filter (see annex M, instance 674) that has one basket.
730	**Slip_on_flange**	A Pipe_flange (see annex M, instance 710) that is designed for use by being slipped over a Pipe and welded on both sides.
731	**Socket**	A Pipe_fitting (see annex M, instance 711) that connects Pipes (see annex M, instance 707) with the same centre line and that overlaps the Pipe ends.
732	**Socket_weld_flange**	A Pipe_flange (see annex M, instance 710) that has a socket for welding.
733	**Spacer_and_blind**	A Pipe_flange (see annex M, instance 710) that consists of two components, that are mounted between two other Piping_flanges and that provide a tight shut off.
734	**Spectacle_blind**	A Pipe_flange (see annex M, instance 710) that is mounted between two other Piping_flanges and that provides a tight shut off.
735	**Spool_piece**	A Piping_spool (see annex M, instance 719) that is designed for temporary installation.
736	**Spray_nipple**	A Nipple (see annex M, instance 568) that is designed for use spraying a fluid.
737	**Stand_pipe**	A Pipe (see annex M, instance 707) that is a vertical and structurally self supporting.
738	**Straight_pipe**	A Pipe (see annex M, instance 707) that is straight.
739	**Stub**	A Pipe_fitting (see annex M, instance 711) that has a collar at one end for use in conjunction with a Pipe_flange (see annex M, instance 710).
740	**Swage_nipple**	A Pipe_fitting (see annex M, instance 711) that is a movable Nipple (see annex M, instance 568).

Table M.23 – Specified instances of Class_of_material for piping and insulation (concluded)

inst.	name	definition
741	**Tee**	A Pipe_fitting (see annex M, instance 711) that connects three Pipes (see annex M, instance 707). Two of the Pipes have the same centre line and form a straight run. The third Pipe has a centre line that intersects the centre line of the other two and forms a branch outlet. The branch outlet is at 90 degrees to the main run.
742	**Threaded_flange**	A Pipe_flange (see annex M, instance 710) that makes a screwed connection.
743	**Tongue_and_groove_-flange**	A Pipe_flange (see annex M, instance 710) that has a tongue portion on one joint surface that may be inserted into the groove portion on the other joint surface.
744	**U_trap**	A Piping_component (see annex M, instance 717) that does is designed for use as a Vapour_trap (see annex M, instance 279) preventing reverse gas flow, and that consists of a U-shaped Pipe holding liquid.
745	**Union**	A Pipe_fitting (see annex M, instance 711) that is an assembly of three parts comprising two threaded ends and a centre piece that draws the two ends together when rotated.
746	**Vertical_leaf_Niagara_-filter**	A Piping_component (see annex M, instance 717) that is designed for use as a Filter (see annex M, instance 248), that is installed vertically and that has with overlapping filter elements.
747	**Weld_neck_flange**	A Pipe_flange (see annex M, instance 710) that has a long neck and a long hub and that is mainly used for butt welded connections.
748	**Y_type_strainer**	A Piping_component (see annex M, instance 717) that is designed for use as a Strainer (see annex M, instance 275) and that has the shape of a Y.

M.6.7 Specified instance of Class_of_material for plants and systems

Specified instances of Class_of_material relevant to plants and complete systems are defined in table M.24.

Table M.24 – Specified instances of Class_of_material for plants and systems

inst.	name	definition
749	**Barge_supported_rig**	A Material (see 4.2.110) that is designed for use as a Drilling_rig (see annex M, instance 297), and that is mobile. The derrick is placed upon a platform, and all supplementary drilling equipment is placed upon a barge.
750	**Drill_ship**	A Material (see 4.2.110) that is designed for use as a Drilling_rig (see annex M, instance 297) and that is a ship.
751	**Equipment**	A Material (see 4.2.110) that is a main item performing a specific function.
752	**Equipment_assembly**	An Equipment (see annex M, instance 751) that has components designed for use as Auxiliary_systems (see annex M, instance 283).
753	**Main_equipment**	An Equipment (see annex M, instance 751) that plays an essential role or is large.
754	**Mechanical_equipment**	An Equipment (see annex M, instance 751) that consists princpally of moving rigid components.
755	**Package_unit**	A Material (see 4.2.110) that is designed for use as a Unit (see annex M, instance 359), that is acquired as one package, and that is often also installed as one package.
756	**Safety_equipment**	An Equipment (see annex M, instance 751) that is designed for use in a Safety_system (see annex M, instance 346).
757	**Semi_submersible_rig**	A Material (see 4.2.110) that is designed for use as a Drilling_rig (see annex M, instance 297), that floats and has its buoyancy maintained by Pontoons (see annex M, instance 336) that are designed to lie below water level.

M.6.8 Specified instances of Class_of_material for rotating and reciprocating equipment

Specified instances of Class_of_material relevant to rotating and reciprocating equipment are defined in table M.25.

Table M.25 – Specified instances of Class_of_material for rotating and reciprocating equipment

inst.	name	definition
758	**Aero_derivative_gas_-turbine**	A Rotating_equipment (see annex M, instance 820) that is designed for use as a Gas_turbine (see annex M, instance 401), and that has a design adapted from aviation to industrial use.
759	**Air_cooled_steam_turbine**	A Steam_turbine (see annex M, instance 432) that is air cooled.
760	**Archimedian_screw_-pump**	A Rotating_equipment (see annex M, instance 820) and a Pump_equipment (see annex M, instance 812) that uses an Archimedian_screw (see annex M, instance 839).
761	**Axial_compressor**	An Impulse_compressor (see annex M, instance 797) that has a low pressure ratio compared to a Centrifugal_compressor (see annex M, instance 773).
762	**Axial_flow_blower**	A Blower (see annex M, instance 767) that has an axial flow direction.
763	**Axial_turbine_mixer**	A Rotating_equipment (see annex M, instance 820) that is designed for use as a Mixer (see annex M, instance 410), that gives a flow direction along the Impeller (see annex M, instance 911) Shaft (see annex M, instance 978) axis.
764	**Back_pressure_steam_-turbine**	A Rotating_equipment (see annex M, instance 820) that is designed for use as a Steam_turbine (see annex M, instance 432) with an exhaust above atmospheric pressure.
765	**Ball_mill**	An Equipment (see annex M, instance 751) that is designed to crush a solid and that uses balls.
766	**Bellow_pump**	A Reciprocating_positive_displacement_pump (see annex M, instance 815) that uses a deformable bellows.

Table M.25 – Specified instances of Class_of_material for rotating and reciprocating equipment (continued)

inst.	name	definition
767	**Blower**	An Impulse_compressor (see annex M, instance 797) that compresses gasses for low pressure ratios and large volumes.
768	**Bottom_entry_mixer**	A Rotating_equipment (see annex M, instance 820) that is designed for use as a Mixer (see annex M, instance 410) installed at the bottom of a Vessel (see annex M, instance 1113).
769	**Bowl_centrifuge**	A Rotating_equipment (see annex M, instance 820) that is designed for use as a Centrifuge (see annex M, instance 375) separating fluids within a bowl.
770	**Bucket_pump**	A Rotating_positive_displacement_pump (see annex M, instance 821) that lifts a fluid by means of buckets.
771	**Cable_pump**	A Drawn_fluid_pump (see annex M, instance 783) that lifts viscous liquids by means of an endless cable.
772	**Canned_motor_pump**	A Centrifugal_pump (see annex M, instance 774) that has its Driver (see annex M, instance 389) lubricated and cooled by the pumped fluid within a common Can (see annex M, instance 865).
773	**Centrifugal_compressor**	An Impulse_compressor (see annex M, instance 797) that has one or more Impellers (see annex M, instance 911) with radial flow vanes.
774	**Centrifugal_pump**	An Impulse_pump (see annex M, instance 798) that has one or more Impellers (see annex M, instance 911) with radial flow vanes.
775	**Close_coupled_pump**	A Rotating_equipment (see annex M, instance 820) and a Pump_equipment (see annex M, instance 812) that either has its Impeller (see annex M, instance 911) supported by the motor Shaft (see annex M, instance 978) or has its Impeller Shaft closely coupled to the motor Shaft.
776	**Close_coupled_vertical_-inline_pump**	A Close_coupled_pump (see annex M, instance 775) that is also a Vertical_inline_pump (see annex M, instance 833).
777	**Compressor_equipment**	An Equipment (see annex M, instance 751) that is is designed for use as a Compressor_system (see annex M, instance 377).

Table M.25 – Specified instances of Class_of_material for rotating and reciprocating equipment (continued)

inst.	name	definition
778	**Condensing_steam_-turbine**	A Steam_turbine (see annex M, instance 432) that has its exhaust steam pressure below atmospheric pressure and that has its exhaust steam condensed by means of a Surface_condenser (see annex M, instance 578).
779	**Diaphragm_compressor**	A Reciprocating_compressor (see annex M, instance 813) that has a metallic diaphragm separating the compression chamber from the lubricating oil etc. in order to guarantee absolute purity of the compressed gas.
780	**Diaphragm_pump**	A Reciprocating_positive_displacement_pump (see annex M, instance 815) that pumps a liquid by the backwards and forwards movement of a diaphragm.
NOTES 1 – The diaphragm prevents leakage of the pumped fluid. 2 – The diaphragm is usually moved by a hydraulic system. 3 – A Diaphragm_pump usually has a small capacity at a relatively high head.		
781	**Diesel_engine**	An Internal_combustion_engine (see annex M, instance 800) that uses compression to cause ignition when in normal operation.
782	**Disc_rotor_pump**	A Rotating_positive_displacement_pump (see annex M, instance 821) that uses a rotating disc at the end of a Shaft (see annex M, instance 978) to displace liquid from suction to discharge.
NOTE – A Disc_rotor_pump usually operates at a relatively low head.		
783	**Drawn_fluid_pump**	A Rotating_equipment (see annex M, instance 820) and a Pump_equipment (see annex M, instance 812) that that transports liquids using viscous friction.
784	**Driven_equipment**	A Rotating_equipment (see annex M, instance 820) that performs its service by means of rotating or reciprocating solid parts, and that must have energy supplied to it by a Driver (see annex M, instance 389).

Table M.25 – Specified instances of Class_of_material for rotating and reciprocating equipment (continued)

inst.	name	definition
785	**Ejector**	An Equipment (see annex M, instance 751) that is designed for use as a Pump_system (see annex M, instance 420) and that consists of a Nozzle (see annex M, instance 569) within a Pipe and that uses a jet of high pressure fluid from the Nozzle into the fluid within the Pipe to induce flow of the fluid within the Pipe.
NOTE – The fluid jet from the Nozzle is usually steam or water. A steam jet Ejector may be designed for use as a Vacuum_pump_system (see annex M, instance 436).		
786	**Expander_equipment**	An Equipment (see annex M, instance 751) that is designed for use as a Expander_system (see annex M, instance 395).
787	**Extrusion_drawn_fluid_-pump**	A Drawn_fluid_pump (see annex M, instance 783) that has a cylindrical or conical spindle to transport a liquid using viscous friction.
788	**Fan**	An Axial_compressor (see annex M, instance 761) that compresses gases at low pressure ratios and at limited discharge pressures.
789	**Flexible_hose_pump**	A Rotating_positive_displacement_pump (see annex M, instance 821) that pumps liquid by means of rolling wheels over a flexible hose.
790	**Flexible_wall_pump**	A Rotating_positive_displacement_pump (see annex M, instance 821) that pumps liquid using an eccentric disc inside a flexible bellows.
791	**Gas_engine**	An Internal_combustion_engine (see annex M, instance 800) that has reciprocating parts and that burns gas.
792	**Gas_lift_pump**	A Pump_equipment (see annex M, instance 812) that pumps a liquid by dispersing a gas within it and using the resulting difference in density.
NOTE – The gas is usually pressurised air.		
793	**Gear_pump**	A Rotating_positive_displacement_pump (see annex M, instance 821) that pumps liquid by means of Gear teeth within a Casing (see annex M, instance 867) such that the Gear meshing prevents reverse flow.
NOTE – A Gear_pump transports liquid with a relatively high back pressure.		

Table M.25 – Specified instances of Class_of_material for rotating and reciprocating equipment (continued)

inst.	name	definition
794	**High_speed_pump**	A Centrifugal_pump (see annex M, instance 774) that runs at high speed in order to generate high head at a low flow.
795	**Horizontal_centrifugal_-pump**	A Centrifugal_pump (see annex M, instance 774) that has a horizontal Shaft (see annex M, instance 978).
796	**Horizontal_electric_-motor**	A Rotating_equipment (see annex M, instance 820) that is designed for use as an Electric_motor (see annex M, instance 391), and that has a horizontal Shaft (see annex M, instance 978).
797	**Impulse_compressor**	A Rotating_equipment (see annex M, instance 820) and a Compressor_equipment (see annex M, instance 777) that operates by imparting kinetic energy to a gas.
798	**Impulse_pump**	A Rotating_equipment (see annex M, instance 820) and a Pump_equipment (see annex M, instance 812) that operates by imparting kinetic energy to a liquid.
799	**Industrial_gas_turbine**	A Rotating_equipment (see annex M, instance 820) that is designed for use as a Gas_turbine (see annex M, instance 401), and that has a design created specifically for industrial duty as a Driver (see annex M, instance 389).
800	**Internal_combustion_-engine**	A Rotating_equipment (see annex M, instance 820) that is designed for use as an Engine (see annex M, instance 393), and that burns fuel inside.
801	**Liquid_ring_compressor**	A Rotating_positive_displacement_compressor (see annex M, instance 819) that has a liquid annulus held by centrifugal force around the inside of the Casing (see annex M, instance 867) caused by a single rotary Impeller (see annex M, instance 911).
NOTE – A Liquid_ring_compressor compresses vapour isothermally.		
802	**Lobe_pump**	A Rotating_positive_displacement_pump (see annex M, instance 821) that that has pairs of shaped Rotors (see annex M, instance 968) to displace the fluid. The Rotors either mesh externally, or internally about eccentric shafts.
803	**Magnetic_pump**	A Centrifugal_pump (see annex M, instance 774) that has an Internal_rotor (see annex M, instance 928).
NOTE – A Magnetic_pump has no Seals (see annex M, instance 971).		

Table M.25 – Specified instances of Class_of_material for rotating and reciprocating equipment (continued)

inst.	name	definition
804	**Multi_stage_centrifugal_-pump**	A Centrifugal_pump (see annex M, instance 774) that has more than two Impellers (see annex M, instance 911).
805	**Natural_draft_fan**	A Fan (see annex M, instance 788) that provides an enhanced flow of air and that is driven by the outside air.
806	**Petrol_engine**	An Internal_combustion_engine (see annex M, instance 800) that uses an electric spark to ignite a petrol air mixture.
807	**Piston_pump**	A Reciprocating_positive_displacement_pump (see annex M, instance 815) that uses a Piston (see annex M, instance 955) to discharge the pressurised fluid.
808	**Plunger_pump**	A Reciprocating_positive_displacement_pump (see annex M, instance 815) that uses a plunger.
NOTES 1 – The plunger may be used in combination with a diaphragm or Piston (see annex M, instance 955) or not. 2 – A Plunger_pump pressurises a liquid at low capacity and high head.		
809	**Positive_displacement_-compressor**	A Rotating_equipment (see annex M, instance 820) and a Compressor_equipment (see annex M, instance 777) that compresses a gas by reducing its volume.
NOTE – A Positive_displacement_compressor may use either the reciprocating or the rotating displacement principle.		
810	**Positive_displacement_-pump**	A Rotating_equipment (see annex M, instance 820) and a Pump_equipment (see annex M, instance 812) that uses the displacement principle.
NOTES 3 – A Positive_displacement_pump may use either the reciprocating or the rotating displacement principle. 4 – A Positive_displacement_pump gives low flow and high back pressure at discharge.		
811	**Propeller_pump**	An Impulse_pump (see annex M, instance 798) that uses a Propeller (see annex M, instance 957).
NOTE – A Propeller_pump generates a low head at large flow.		

Table M.25 – Specified instances of Class_of_material for rotating and reciprocating equipment (continued)

inst.	name	definition
812	**Pump_equipment**	An Equipment (see annex M, instance 751) that is designed for use as a Pump_system (see annex M, instance 420).
813	**Reciprocating_compressor**	A Positive_displacement_compressor (see annex M, instance 809) that has a compressing and displacing element with a reciprocating motion.
NOTE – The reciprocating motion may be in an enclosed space that is cylindrical or some other shape.		
814	**Reciprocating_piston_compressor**	A Reciprocating_compressor (see annex M, instance 813) that has a Piston (see annex M, instance 955) as a compressing and displacing element within a cylindrical space.
815	**Reciprocating_positive_displacement_pump**	A Positive_displacement_pump (see annex M, instance 810) that has a displacing element with a reciprocating motion.
NOTE – The reciprocating motion may be in an enclosed space that is cylindrical or some other shape.		
816	**Rotary_internal_gear_pump**	A Gear_pump (see annex M, instance 793) that has one internal idler Gear and one Rotor (see annex M, instance 968) Gear.
817	**Rotary_piston_pump**	A Rotating_positive_displacement_pump (see annex M, instance 821) that has two intermeshing shaped Rotors (see annex M, instance 968).
818	**Rotary_plunger_pump**	A Rotating_positive_displacement_pump (see annex M, instance 821) that has an eccentric mechanism moving reciprocating plungers in turn.
819	**Rotating_positive_displacement_compressor**	A Positive_displacement_compressor (see annex M, instance 809) that compresses a gas by reducing its volume using the rotating displacement principle.
820	**Rotating_equipment**	An Equipment (see annex M, instance 751) that has rotating or reciprocating solid parts.
821	**Rotating_positive_displacement_pump**	A Positive_displacement_pump (see annex M, instance 810) that has rotating elements.
NOTE – A Rotating_positive_displacement_pump displaces a liquid with high back pressure.		
822	**Screw_compressor**	A Rotating_positive_displacement_compressor (see annex M, instance 819) that uses the intermeshing of two helical Rotors (see annex M, instance 968) to transport the fluid axially.

Table M.25 – Specified instances of Class_of_material for rotating and reciprocating equipment (continued)

inst.	name	definition
823	**Screw_pump**	A Rotating_positive_displacement_pump (see annex M, instance 821) that uses one or more helical Rotors (see annex M, instance 968) to transport the fluid axially.
824	**Side_entry_mixer**	A Rotating_equipment (see annex M, instance 820) that is designed for use as a Mixer (see annex M, instance 410) placed at the side of a Vessel (see annex M, instance 1113).
NOTE – A Side_entry_mixer produces a top to bottom flow pattern in a liquid.		
825	**Single_stage_centrifugal_pump**	A Centrifugal_pump (see annex M, instance 774) that has one Impeller (see annex M, instance 911).
826	**Steam_ejector**	An Ejector (see annex M, instance 785) that creates vacuum using a jet of pressurized steam.
827	**Submerged_centrifugal_pump**	A Centrifugal_pump (see annex M, instance 774) that is immersed in the liquid to be pumped, along with its Electric_motor (see annex M, instance 391).
828	**Two_stage_centrifugal_pump**	A Centrifugal_pump (see annex M, instance 774) that has two Impellers (see annex M, instance 911).
829	**Vane_pump**	A Rotating_positive_displacement_pump (see annex M, instance 821) that uses sliding Vanes (see annex M, instance 1008) attached to an eccentric Rotor (see annex M, instance 968) to displace a liquid.
830	**Variable_speed_motor**	An Electric_motor (see annex M, instance 391) that can be controlled to operate at different angular velocities.
831	**Vertical_centrifugal_pump**	A Centrifugal_pump (see annex M, instance 774) that has a vertical Impeller (see annex M, instance 911) Shaft (see annex M, instance 978) and a vertical Electric_motor (see annex M, instance 391) Shaft.
832	**Vertical_electric_motor**	An Electric_motor (see annex M, instance 391) that has a vertical Shaft (see annex M, instance 978).
833	**Vertical_inline_pump**	A Centrifugal_pump (see annex M, instance 774) that has a vertical Shaft (see annex M, instance 978) and that has side connections so that components can be removed without disconnecting the Pump from the Piping (see annex M, instance 715).

Table M.25 – Specified instances of Class_of_material for rotating and reciprocating equipment (concluded)

inst.	name	definition
834	**Vertical_lineshaft_pump**	A Centrifugal_pump (see annex M, instance 774) that has a vertical Shaft (see annex M, instance 978); that has a suction Barrel (see annex M, instance 852) below grade; and that has a Nozzle_head (see annex M, instance 950) with suction and discharge flanges at grade serving as a Drive_stool (see annex M, instance 889).
835	**Vertical_turbine_pump**	A Vertical_centrifugal_pump (see annex M, instance 831) that is used in a wet pit configuration without a suction Barrel (see annex M, instance 852), and that has the discharge located between the mounting plate and the last stage Impeller (see annex M, instance 911).

M.6.9 Specified instances of Class_of_material for rotating equipment components

Specified instances of Class_of_material relevant to Rotating_equipment (see annex M, instance 820) components are defined in table M.26.

A Material classified by one of these instances of Class_of_Material is a component of a Rotating_equipment or a component associated with a Rotating_equipment.

NOTE – Some of the instances of Class_of_material in this table are defined in terms of the role played by a component or by its position in an assembly.

Table M.26 – Specified instances of Class_of_material for rotating equipment components

inst.	name	definition
836	**Anchor_type_impeller**	An Impeller (see annex M, instance 911) that is contoured and two bladed.
NOTE – An Anchor_type_impeller is used for mixing high viscosity liquids.		
837	**Angle_gear_box**	A Gear_box (see annex M, instance 903) that changes the direction of the drive axis.
838	**Anti_friction_bearing**	A Bearing (see annex M, instance 854) that uses rolling bearing elements such as balls, rollers or needles.
839	**Archimedian_screw**	A Material (see 4.2.110) that is a Shaft (see annex M, instance 978) with deep threads running in a cylinder or half cylinder.
840	**Auxiliary_impeller**	An Impeller (see annex M, instance 911) that controls the internal pressure and flow in Pump_equipment (see annex M, instance 812).
841	**Axial_diffuser**	A Diffuser (see annex M, instance 883) that guides the pumped flow or compressed gas either to the next stage or to the outlet.
842	**Axial_flow_impeller**	An Impeller (see annex M, instance 911) that creates a flow in the direction of the Shaft (see annex M, instance 978) axis.
843	**Axial_flow_mixer_impeller**	A Mixer_impeller (see annex M, instance 944) that creates a flow in the direction of the Shaft (see annex M, instance 978) axis.
NOTE – An Axial_flow_mixer_impeller produces lower shear and higher flow rates in mixing fluids than radial flow Mixer_impellers.		

Table M.26 – Specified instances of Class_of_material for rotating equipment components (continued)

inst.	name	definition
844	**Balance_counter_disc**	A Rotating_equipment_component (see annex M, instance 966) that is a disc fastened to a Shaft (see annex M, instance 978) as a counterpart to a Balance_disc_sheet (see annex M, instance 846), and that forms part of a Balance_disc_assembly (see annex M, instance 845).
845	**Balance_disc_assembly**	A Thrust_balance_assembly (see annex M, instance 1000) that contains a Balance_counter_disc (see annex M, instance 844).
846	**Balance_disc_sheet**	A Rotating_equipment_component (see annex M, instance 966) that is a sheet attached to a Casing (see annex M, instance 867) forming part of a Balance_disc_assembly (see annex M, instance 845).
847	**Balance_drum**	A Rotating_equipment_component (see annex M, instance 966) that is a drum fastened to a Shaft (see annex M, instance 978) as a counterpart to a Balance_liner (see annex M, instance 849), and that forms part of a Balance_drum_assembly (see annex M, instance 848).
848	**Balance_drum_assembly**	A Thrust_balance_assembly (see annex M, instance 1000) that contains a Balance_drum (see annex M, instance 847).
849	**Balance_liner**	A Rotating_equipment_component (see annex M, instance 966) that is a liner inserted into a Casing (see annex M, instance 867) to form part of a Balance_drum_assembly (see annex M, instance 848).
850	**Balancing_chamber**	A Rotating_equipment_component (see annex M, instance 966) that balances thrust from impellers.
851	**Bar_turbine_impeller**	A Mixer_impeller (see annex M, instance 944) that is is multi-bladed and bolted or welded to the top and bottom of a supporting disc.
NOTE – A Bar_turbine_impeller produces high shear rates in mixing fluids.		
852	**Barrel**	A Casing (see annex M, instance 867) that is of a Pump_equipment (see annex M, instance 812) or Compressor_equipment (see annex M, instance 777) and that encloses either the Inner_casing (see annex M, instance 924) or the bolted-up stage section.

Table M.26 – Specified instances of Class_of_material for rotating equipment components (continued)

inst.	name	definition
853	**Base_plate**	A Material (see 4.2.110) that is a supporting frame or plate made of metal for an Equipment (see annex M, instance 751).
854	**Bearing**	An Equipment_component (see annex M, instance 594 that supports and locates a moving or static part.
855	**Bearing_assembly**	An Equipment_component (see annex M, instance 594 that is an assembly of one or more Bearings (see annex M, instance 854) and associated components.
856	**Bearing_bracket**	An Equipment_component (see annex M, instance 594) that supports a Bearing_assembly (see annex M, instance 855).
857	**Bearing_bushing**	A Rotating_equipment_component (see annex M, instance 966) that is the bearing part of a Sleeve_bearing (see annex M, instance 984).
858	**Bearing_cap**	A Cover (see annex M, instance 879) that holds a Bearing (see annex M, instance 854) in position.
859	**Bearing_circlip_ring**	A Connector (see annex M, instance 542) that locates a Bearing (see annex M, instance 854) within a Bearing_assembly (see annex M, instance 855).
860	**Bearing_housing**	A Rotating_equipment_component (see annex M, instance 966) that directly supports a Bearing (see annex M, instance 854).
861	**Bearing_locknut**	A Nut (see annex M, instance 1171) that fastens a Bearing (see annex M, instance 854) on to a Shaft (see annex M, instance 978).
862	**Bearing_lubrication_ring**	A Lubrication_ring (see annex M, instance 937). that lifts lubrication oil from a Bearing_housing (see annex M, instance 860) to a Shaft (see annex M, instance 978).
863	**Belt_drive**	A Material_assembly (see annex M, instance 544) that consists of pulleys and belts, and that is designed for use as a Transmission_system (see annex M, instance 357).
864	**Bush**	A Sleeve (see annex M, instance 983) that fits closely on to a Shaft (see annex M, instance 978) or Pipe (see annex M, instance 707) and tightly into a hole.
865	**Can**	A Casing (see annex M, instance 867) that is an enclosure for a Pump_equipment (see annex M, instance 812) and possibly a Driver (see annex M, instance 389).

Table M.26 – Specified instances of Class_of_material for rotating equipment components (continued)

inst.	name	definition
866	**Cartridge_mechanical_-seal**	A Mechanical_seal (see annex M, instance 942) that is pre-assembled for sliding on to a Shaft (see annex M, instance 978) and bolting to a face.
867	**Casing**	An Enclosure (see annex M, instance 543) that contains the pressure of a fluid, encloses components of an Equipment (see annex M, instance 751), or both.
868	**Casing_gasket**	A Gasket (see annex M, instance 901) that seals the connection between parts of a Casing (see annex M, instance 867).
869	**Casing_nut**	A Nut (see annex M, instance 1171) that joins parts of a Casing (see annex M, instance 867).
870	**Casing_stud**	A Stud (see annex M, instance 1188) that joins parts of a Casing (see annex M, instance 867).
871	**Casing_wear_ring**	A Wear_ring (see annex M, instance 1009) that is located in a Casing (see annex M, instance 867).
872	**Centering_ring**	A Rotating_equipment_component (see annex M, instance 966 that is mounted between a suction cover and a Bearing_-bracket (see annex M, instance 856) and that is both a housing for a Pump_equipment (see annex M, instance 812) Shaft (see annex M, instance 978) Sleeve_bearing (see annex M, instance 984) and a support for a Spacer_can (see annex M, instance 985).
873	**Collar**	An Equipment_component (see annex M, instance 594) that is in the shape of a ring and that positions another Equipment_-component on a cylindrical Material object such as a Shaft (see annex M, instance 978).
874	**Collar_packing**	A Packing (see annex M, instance 980) that is compressed inside a Collar housing to prevent leakage along a Shaft (see annex M, instance 978).
875	**Compressor_impeller**	An Impeller (see annex M, instance 911) that is designed for use within Compressor_equipment (see annex M, instance 777).
876	**Compressor_or_-expander_seal**	A Seal (see annex M, instance 971) that is designed for use in Compressor_equipment (see annex M, instance 777) or Expander_equipment (see annex M, instance 786).

Table M.26 – Specified instances of Class_of_material for rotating equipment components (continued)

inst.	name	definition
877	**Compressor_seal**	A Compressor_or_expander_seal (see annex M, instance 876) that does duty in Compressor_equipment (see annex M, instance 777).
878	**Coupling_guard**	A Rotating_equipment_component (see annex M, instance 966) that ensures safety by preventing people from touching a rotating Coupling (see annex M, instance 383).
879	**Cover**	An Equipment_component (see annex M, instance 594) that is a removable enclosure.
880	**Cylinder_liner**	A Bush (see annex M, instance 864) that is a replaceable liner inside a cylinder.
881	**Deepwell_pump_liquid_seal**	A Seal (see annex M, instance 971) that separates oil in a submersible electric motor from the pumped product in a Well (see annex M, instance 363).
882	**Diaphragm_coupling**	A Coupling (see annex M, instance 383) that connects a Driver (see annex M, instance 389) to a Driven_equipment item (see annex M, instance 784) and that transmits torque by means of contoured diaphragms.
NOTE – A Diaphragm_coupling can work with misaligned Shafts (see annex M, instance 978).		
883	**Diffuser**	A Rotating_equipment_component (see annex M, instance 966) that increases pressure by decreasing velocity.
884	**Discharge_column**	An Equipment_component (see annex M, instance 594) that has a cylindrical shape and that guides a discharge flow to grade.
885	**Discharge_cover**	A Cover (see annex M, instance 879) that is a removable part of a pressurized Casing (see annex M, instance 867) and that has a shape suitable to serve as a discharge outlet.
886	**Discharge_elbow**	An Elbow (see annex M, instance 691) that guides a discharge flow and that is mounted on top of a mounting plate as an extension to a Discharge_column (see annex M, instance 884).
887	**Double_mechanical_seal**	A Mechanical_seal (see annex M, instance 942) that consists of two other Mechanical_seals mounted back to back or face to face in order to retain a buffer fluid between them.

Table M.26 – Specified instances of Class_of_material for rotating equipment components (continued)

inst.	name	definition
888	**Double_spiral_mixer_-impeller**	A Mixer_impeller (see annex M, instance 944) that has a helical inner and a helical outer flight.
NOTE – A Double_spiral_mixer_impeller is usually intended to mix highly viscous fluids.		
889	**Drive_stool**	A Support (see annex M, instance 1189) that supports a motor.
890	**Driven_end_radial_-bearing**	A Radial_bearing (see annex M, instance 960 that is at the driven end of a Shaft (see annex M, instance 978).
891	**Driven_end_thrust_-bearing**	A Thrust_bearing (see annex M, instance 1001) that is at the driven end of a Shaft (see annex M, instance 978).
892	**Dry_gas_seal**	A Compressor_or_expander_seal (see annex M, instance 876) that seals Compressor_equipment (see annex M, instance 777) or Expander_equipment (see annex M, instance 786) by means of dry gas.
NOTE – The gas in a Dry_gas_seal is either filtered discharged process gas or a clean buffer gas.		
893	**Dry_running_seal**	A Mechanical_seal (see annex M, instance 942) that operates without liquid lubrication between its faces.
NOTE – A Dry_running_seal may be either a main or a backup Seal.		
894	**Epicyclic_gear_box**	A Gear_box (see annex M, instance 903) that has intermediate Gears rolling between concentric inner and outer Gears.
895	**Expander_impeller**	An Impeller (see annex M, instance 911) that is designed for use in Expander_equipment (see annex M, instance 786).
NOTE – An Expander_impeller derives energy from a fluid through dynamic force.		
896	**Expander_seal**	A Compressor_or_expander_seal (see annex M, instance 876) that is designed for use in Expander_equipment (see annex M, instance 786).
897	**Flat_blade_impeller**	A Mixer_impeller (see annex M, instance 944) that has vertical blades bolted to a support disc.
NOTE – A Flat_blade_impeller produces a high shear or turbulence in mixing fluids.		
898	**Floating_ring_seal**	A Bush (see annex M, instance 864) that has Labyrinth_seals (see annex M, instance 933) and slingers and that provides pressurised oil injection to the rotating Seal faces.

Table M.26 – Specified instances of Class_of_material for rotating equipment components (continued)

inst.	name	definition
899	**Fluid_coupling**	A Rotating_equipment_component (see annex M, instance 966) that is designed for use as a Clutch (see annex M, instance 376), and that uses a fluid.
900	**Foot_valve_adapter**	An Equipment_component (see annex M, instance 594) that is mounted between a Foot_valve (see annex M, instance 450) and and adapter seat of an Equipment item (see annex M, instance 751).
901	**Gasket**	A Material (see 4.2.110) that is a sheet designed to deform when compressed between two surfaces so that a tight fit is achieved irrespective of imperfections in the surfaces.
902	**Gear**	A Rotating_equipment_component (see annex M, instance 966) that is a toothed wheel designed to mesh with another Gear or with a toothed rack.
903	**Gear_box**	A Rotating_equipment_component (see annex M, instance 966) that is designed for use as a Transmission_system (see annex M, instance 357) and that is an enclosed arrangement of Gear sets transmitting torque between two Shafts (see annex M, instance 978).
NOTE – The angular velocities of two Shafts connected by a Gear_box may be different.		
904	**Gear_type_coupling**	A Coupling (see annex M, instance 383) that uses Gear profile splined Hubs (see annex M, instance 909) and Sleeves (see annex M, instance 983) to transmit rotation.
NOTE – A Gear_type_coupling works with small angles of Shaft (see annex M, instance 978) misalignment.		
905	**Gland_plate**	An Equipment_component (see annex M, instance 594) that is an end plate connecting the non-rotating part of a Seal (see annex M, instance 971) to a Seal housing.
906	**Grease_nipple**	A Nipple (see annex M, instance 568) that enables the input of grease lubricant.
907	**High_speed_shaft**	A Shaft (see annex M, instance 978) that has the highest speed in a Gear_box (see annex M, instance 903) or High_speed_pump (see annex M, instance 794).
NOTE – An Intermediate_shaft (see annex M, instance 927) is not a High_speed_shaft.		

Table M.26 – Specified instances of Class_of_material for rotating equipment components (continued)

inst.	name	definition
908	**Hood**	An Enclosure (see annex M, instance 543) that either protects an Equipment item (see annex M, instance 751) from the weather or protect the surroundings from accoustic noise generated by the Equipment item.
909	**Hub**	A Rotating_equipment_component (see annex M, instance 966) that is at the centre of a rotating part and that has a hole for a Shaft (see annex M, instance 978).
910	**Idler_shaft**	An Intermediate_shaft (see annex M, instance 927) that is within a Gear train and that does not transmit energy from input to the output Shaft (see annex M, instance 978).
911	**Impeller**	A Rotating_equipment_component (see annex M, instance 966) that is a set of rotating Vanes (see annex M, instance 1008) within an enclosure, and that imparts energy to, or derives energy from, a fluid by dynamic force.
912	**Impeller_assembly**	A Rotating_equipment_component (see annex M, instance 966) that is an assembly of other Rotating_equipment_components and that includes an Impeller (see annex M, instance 911) as the main component..
913	**Impeller_back**	A Cover (see annex M, instance 879) that is the back cover of an Impeller (see annex M, instance 911) The back cover is on the stuffing box side.
914	**Impeller_front**	A Cover (see annex M, instance 879) that is the front cover of an Impeller (see annex M, instance 911) The front cover is on the suction side.
915	**Impeller_gasket**	A Gasket (see annex M, instance 901) that is deformable and that prevents leakage between an Impeller_hub (see annex M, instance 916) and an Impeller_nut (see annex M, instance 918).
916	**Impeller_hub**	A Hub (see annex M, instance 909) that is of an Impeller (see annex M, instance 911).
917	**Impeller_key**	A Shaft_key (see annex M, instance 979) that fastens an Impeller (see annex M, instance 911) on to a Shaft (see annex M, instance 978).
918	**Impeller_nut**	A Nut (see annex M, instance 1171) that fastens an Impeller (see annex M, instance 911) to the end of a Shaft (see annex M, instance 978).

Table M.26 – Specified instances of Class_of_material for rotating equipment components (continued)

inst.	name	definition
919	**Impeller_shroud**	An Impeller_hub (see annex M, instance 916) that is of an Impeller_front (see annex M, instance 914) and that is located at an Impeller outer diameter.
920	**Impeller_vane**	A Vane (see annex M, instance 1008) that guides the fluid through an Impeller (see annex M, instance 911).
921	**Impeller_wear_ring**	A Wear_ring (see annex M, instance 1009) that is attached to an Impeller (see annex M, instance 911).
922	**Inboard_impeller_-bearing**	A Bearing (see annex M, instance 854) that is close to the Impeller (see annex M, instance 911) or Impellers.
923	**Inducer**	An Axial_flow_impeller (see annex M, instance 842) that is separate and that has a special design to reduce the NPSHR (see 3.6).
924	**Inner_casing**	A Casing (see annex M, instance 867) that encloses a pumped or compressed fluid and that is subject to the discharge pressure.
925	**Intermediate_impeller_-bearing**	A Bearing (see annex M, instance 854) that is between the Inboard_impeller_bearing (see annex M, instance 922) and the Outboard_impeller_bearing (see annex M, instance 952).
926	**Intermediate_impeller_-bearing_spider**	A Rotating_equipment_component (see annex M, instance 966) that supports an Intermediate_impeller_bearing (see annex M, instance 925).
927	**Intermediate_shaft**	A Shaft (see annex M, instance 978) that is neither the highest nor the lowest speed shaft in a Gear train.
928	**Internal_rotor**	A Rotating_equipment_component (see annex M, instance 966) that is an inner Rotor (see annex M, instance 968) containing magnets and an Impeller (see annex M, instance 911), and that is magnetically driven by an outer Rotor coupled to an Electric_motor (see annex M, instance 391).
929	**Interstage_bushing**	A Bush (see annex M, instance 864) that is located between the inboard and outboard Bush on a Rotor (see annex M, instance 968).
930	**Interstage_shaft_sleeve**	A Shaft_sleeve (see annex M, instance 981) that is located on a Shaft (see annex M, instance 978) between two Impellers (see annex M, instance 911).

Table M.26 – Specified instances of Class_of_material for rotating equipment components (continued)

inst.	name	definition
931	**Iso_carbon_seal**	A Mechanical_contact_seal (see annex M, instance 941) that has a stationary carbon ring in contact with a Shaft (see annex M, instance 978).
NOTE – An Iso_carbon_seal separates oil and gas during operation and stand-still.		
932	**Iso_sleeve_seal**	A Compressor_or_expander_seal (see annex M, instance 876) that has sealing rings or Bushes (see annex M, instance 864) and Labyrinth_seals (see annex M, instance 933), and that operates with a sealing liquid in order to prevent gas leakage.
933	**Labyrinth_seal**	A Seal (see annex M, instance 971) that has castellations to create long leakage paths with low flow areas over a short section of a Shaft (see annex M, instance 978).
934	**Lifting_lug**	An Equipment_component (see annex M, instance 594) that is designed to enable an Equipment (see annex M, instance 751) to be lifted or transported.
935	**Liquid_seal**	A Seal (see annex M, instance 971) that has a liquid film between the Seal faces.
NOTE – The liquid film is designed to remove heat.		
936	**Low_speed_shaft**	A Shaft (see annex M, instance 978) that has the lowest speed in a Gear_box (see annex M, instance 903) or High_speed_pump (see annex M, instance 794).
NOTE – An Intermediate_shaft (see annex M, instance 927) is not a Low_speed_shaft.		
937	**Lubrication_ring**	A Ring (see annex M, instance 611) that is loose and that rotates with a Shaft (see annex M, instance 978) dipping into oil to lift lubricant up to the bearing area.
NOTE – A Lubrication_ring is usually made of metal.		
938	**Magnetic_bearing**	A Bearing (see annex M, instance 854) that maintains the relative position of a Rotor (see annex M, instance 968) with respect to a Stator (see annex M, instance 988) by magnetic force.
939	**Magnetic_coupling**	A Coupling (see annex M, instance 383) that uses magnetic force to transmit load between Shafts (see annex M, instance 978).

Table M.26 – Specified instances of Class_of_material for rotating equipment components (continued)

inst.	name	definition
940	**Marine_type_impeller**	A Mixer_impeller (see annex M, instance 944) that is a three bladed Propeller with constant pitch skew backed blades.
NOTE – A Marine_type_impeller performs a down pumping action at a tank bottom in order to mix liquids.		
941	**Mechanical_contact_seal**	A Compressor_or_expander_seal (see annex M, instance 876) that has Labyrinth_seals (see annex M, instance 933) and slingers and that provides pressurised oil injection to the rotating Seal faces.
942	**Mechanical_seal**	A Seal (see annex M, instance 971) that has a set of one or more rotating and stationary Seal faces separated by a fluid film in order to reduce leakage around a rotating Shaft (see annex M, instance 978).
943	**Metal_bellow_seal**	A Mechanical_seal (see annex M, instance 942) that has bellows to provide loading and expansion at the Seal faces and secondary sealing (?).
944	**Mixer_impeller**	An Impeller (see annex M, instance 911) that imparts energy to a fluid in order to cause flow, head and shear for a mixing process.
945	**Motor_casing**	A Casing (see annex M, instance 867) that encloses the Stator (see annex M, instance 988) of an Electric_motor and the motor internals.
946	**Motor_casing_cover**	A Cover (see annex M, instance 879) that is an intermediate part between a Pump_equipment (see annex M, instance 812) Casing (see annex M, instance 867) and a motor Casing.
947	**Non_driven_end_radial_-bearing**	A Radial_bearing (see annex M, instance 960 that is at the non-driven end of a shaft.
948	**Non_driven_end_thrust_-bearing**	A Thrust_bearing (see annex M, instance 1001) that is at the non-driven end of a shaft.
949	**Non_sparking_enclosure**	A Coupling_guard (see annex M, instance 878) that does not create sparks when struck by a Rotating_equipment item (see annex M, instance 820).
950	**Nozzle_head**	An Equipment_component (see annex M, instance 594) that incorporates suction and discharge nozzles as well as a stuffing box and that serves as an integral motor part.

Table M.26 – Specified instances of Class_of_material for rotating equipment components (continued)

inst.	name	definition
951	**O_ring**	A Gasket (see annex M, instance 901) that has a toroidal shape.
952	**Outboard_impeller_-bearing**	A Bearing (see annex M, instance 854) that is close to the end of a Shaft (see annex M, instance 978) furthest from the Impeller (see annex M, instance 911).
953	**Parallel_gear_box**	A Gear_box (see annex M, instance 903) that has parallel-shaft type Gears.
954	**Pinion_gear**	A Gear (see annex M, instance 902) that is the smaller of two meshing Gears.
955	**Piston**	A Rotating_equipment_component (see annex M, instance 966) that moves backwards and forwards changing the length of an enclosed cylindrical space and that loads or discharges pressurised liquid or gas.
956	**Pivot_shoe_thrust_-bearing**	A Thrust_bearing (see annex M, instance 1001) that has bearing pads that tilt to allow oil wedges to form between the pad and the thrust disc.
957	**Propeller**	An Axial_flow_impeller (see annex M, instance 842) that is unenclosed.
958	**Pump_impeller**	An Impeller (see annex M, instance 911) that does duty in Pump_equipment (see annex M, instance 812).
959	**Pusher_type_seal**	A Mechanical_seal (see annex M, instance 942) that contains a secondary Seal (see annex M, instance 971) pushed along a Shaft (see annex M, instance 978) or Shaft_sleeve (see annex M, instance 981) to compensate for face wear.
960	**Radial_bearing**	A Bearing (see annex M, instance 854) that supports a Shaft (see annex M, instance 978) or Rotor (see annex M, instance 968) in a radial direction.
961	**Radial_bearing_assembly**	An Equipment_component (see annex M, instance 594) that is an assembly of one or more Radial_bearings (see annex M, instance 960) and associated components.
962	**Radial_bearing_bracket**	A Bearing_bracket (see annex M, instance 856) that supports a Radial_bearing_assembly (see annex M, instance 961).
963	**Radial_bearing_housing**	A Bearing_housing (see annex M, instance 860) that supports a Radial_bearing (see annex M, instance 960).

Table M.26 – Specified instances of Class_of_material for rotating equipment components (continued)

inst.	name	definition
964	**Restrictive_ring_seal**	A Compressor_seal (see annex M, instance 877) that has carbon rings in retainers in order to prevent gas leakage.
965	**Right_angle_gear_box**	A Gear_box (see annex M, instance 903) that has crossed-axis Gears at right angles.
966	**Rotating_equipment_-component**	An Equipment_component (see annex M, instance 594) that is part of a Rotating_equipment item (see annex M, instance 820).
967	**Rotating_face**	A Rotating_equipment_component (see annex M, instance 966) that is a Seal (see annex M, instance 971) face that rotates with a Shaft (see annex M, instance 978).
968	**Rotor**	A Rotating_equipment_component (see annex M, instance 966) that is an assembly of a Shaft (see annex M, instance 978) and other rotating parts such as Impellers (see annex M, instance 911), Sleeves (see annex M, instance 983) Bearings (see annex M, instance 854) etc..
969	**Screw**	A Material (see 4.2.110) that is a solid cylinder with a head of larger diameter at one end; that is threaded for all or part of its length; and that is designed to be used as a fastener screwed into a threaded hole.
970	**Screw_impeller**	A Impeller (see annex M, instance 911) that has a helical shape.
971	**Seal**	An Equipment_component (see annex M, instance 594) that reduces or prevents the movement of fluid from one area to another.
NOTE – A Seal may prevent fluid loss, equipment damage or contamination.		
972	**Seal_bellow**	A Seal (see annex M, instance 971) that has a bellows to compensate for expansion and contraction, so that Seal faces may be loaded and moved yet still prevent leakage either along a Shaft (see annex M, instance 978) or past stationary compression units.
NOTE – A Seal_bellow may be either of metal or elastomer.		
973	**Seal_collar**	A Collar (see annex M, instance 873) that fastens the rotary unit of a Mechanical_seal (see annex M, instance 942) to a Shaft (see annex M, instance 978).
NOTE – A Seal_collar is usually fastened by a Set screw (see annex M, instance 977).		

Table M.26 – Specified instances of Class_of_material for rotating equipment components (continued)

inst.	name	definition
974	**Seal_orifice**	A Material (see 4.2.110) that contains an orifice and that limits the flow of seal flushing fluid to a Seal (see annex M, instance 971).
975	**Seal_spring**	A Material (see 4.2.110) that is a spring located between a Collar (see annex M, instance 873) and a compression ring and that pushes Seal faces together in order to have a constant pressure on a rotating Seal ring.
976	**Seat_gasket**	An O_ring (see annex M, instance 951) that seals a stationary face of a Mechanical_seal (see annex M, instance 942) against a Seal end plate.
977	**Set_screw**	A Screw (see annex M, instance 969) that fastens either a Seal_collar (see annex M, instance 973) or a Seal Sleeve (see annex M, instance 983) on to a Shaft (see annex M, instance 978).
978	**Shaft**	An Equipment_component (see annex M, instance 594) that is a core rotating element on which rotating parts are mounted.
NOTE – A rotating Shaft can transmit energy.		
979	**Shaft_key**	A Rotating_equipment_component (see annex M, instance 966) that is a metal wedge fitting between a slot in a Shaft (see annex M, instance 978) and a slot in a rotating element in order to fasten the rotating element to the Shaft.
980	**Packing**	A Material (see 4.2.110) that may be compressed within an enclosed space to reduce leakage.
NOTES 1 – A Packing is often coils of woven material. 2 – A Packing may be pressed lightly against a rotating Shaft (see annex M, instance 978) to reduce leakage between a Shaft and a Casing (see annex M, instance 867).		

Table M.26 – Specified instances of Class_of_material for rotating equipment components (continued)

inst.	name	definition
981	**Shaft_sleeve**	A Sleeve (see annex M, instance 983) that is a bushing part around a Shaft (see annex M, instance 978).
NOTES 1 – A Shaft_sleeve may be used to mount and position components such as Bearings (see annex M, instance 854), Seals (see annex M, instance 971), Impellers (see annex M, instance 911) and other Rotor (see annex M, instance 968) parts. 2 – A Shaft_sleeve may protect a Shaft from a Process_material (see 4.2.136) or other fluid.		
982	**Single_mechanical_seal**	A Mechanical_seal (see annex M, instance 942) that contains one rotating and one stationary Seal (see annex M, instance 971) face.
983	**Sleeve**	An Equipment_component (see annex M, instance 594) that is a short hollow cylinder manufactured to precise tolerances so that it fits to another component either on the inside or on the outside or both.
984	**Sleeve_bearing**	A Bush (see annex M, instance 864) that is designed for use as a Radial_bearing (see annex M, instance 960).
985	**Spacer_can**	A Can (see annex M, instance 865) that separates an internal Rotor (see annex M, instance 968) and an externally driven Rotor.
986	**Spur_gear**	A Gear (see annex M, instance 902) that has teeth making contact with the mating Gear along the full length of their face at the same moment.
987	**Stage_casing**	A Casing (see annex M, instance 867) that is of a single stage in a multi-stage Rotating_equipment item (see annex M, instance 820), such as a Multi_stage_centrifugal_pump (see annex M, instance 804), and that is connected to one or more other Casings.
988	**Stator**	An Equipment_component (see annex M, instance 594) that is non-rotating electrical induction coils.
989	**Stator_can**	A Can (see annex M, instance 865) that contains a Stator (see annex M, instance 988).
990	**Steel_cable_guard**	An Equipment_component (see annex M, instance 594) that protects and houses a power supply cable and is made of steel.

Table M.26 – Specified instances of Class_of_material for rotating equipment components (continued)

inst.	name	definition
991	**Step_down_gear_box**	A Gear_box (see annex M, instance 903) that increases torque and reduces angular velocity.
992	**Step_up_gear_box**	A Gear_box (see annex M, instance 903) that increases angular velocity and reduces torque.
993	**Suction_bowl**	An Equipment_component (see annex M, instance 594) that is a part of a Casing (see annex M, instance 867) and that guides the pumped liquid to the inlet.
994	**Suction_can**	A Can (see annex M, instance 865) that holds a complete inner pumping element and that is located below grade.
NOTE – A Suction_can is usually a welded part.		
995	**Suction_cover**	A Cover (see annex M, instance 879) that is a part of a Pump_equipment (see annex M, instance 812) Casing (see annex M, instance 867) and that allows liquid to enter a Pump.
996	**Support_column**	An Equipment_component (see annex M, instance 594) that guides pumped liquid to its place of discharge from a vertical Submerged_centrifugal_pump (see annex M, instance 827).
997	**Tandem_mechanical_seal**	A Mechanical_seal (see annex M, instance 942) that is an assembly of two Mechanical_seals mounted in series. The inner Seal retains the main body of the fluid at a high pressure and the outer Seal retains a buffer fluid at lower pressure.
NOTE – In a Tandem_mechanical_seal the Seals are mounted facing in the same direction and not face to face or back to back as in a Double_mechanical_seal (see annex M, instance 887).		
998	**Throat_bushing**	A Bush (see annex M, instance 864) that is located between an Impeller_back (see annex M, instance 913) and a stuffing box in order to reduce the stuffing box pressure.
999	**Throttle_bushing**	A Bush (see annex M, instance 864) that is square or rectangular in cross section and that is designed to prevent sudden leakage in the event of a Seal (see annex M, instance 971) failure.
NOTE – A Throttle_bushing is usually located in a bore at the rear end of the Seal end plate.		

Table M.26 – Specified instances of Class_of_material for rotating equipment components (concluded)

inst.	name	definition
1000	**Thrust_balance_assembly**	A Rotating_equipment_component (see annex M, instance 966) that balances the thrust from Impellers (see annex M, instance 911).
NOTE – A Thrust_balance_assembly can also reduce Seal (see annex M, instance 971) pressure.		
1001	**Thrust_bearing**	A Bearing (see annex M, instance 854) that supports residual axial load on a Shaft (see annex M, instance 978).
1002	**Thrust_bearing_bracket**	A Bearing_bracket (see annex M, instance 856) that supports a Thrust_bearing (see annex M, instance 1001).
1003	**Thrust_bearing_housing**	A Bearing_housing (see annex M, instance 860) that supports a Thrust_bearing (see annex M, instance 1001).
1004	**Thrust_bearing_plate**	An Equipment_component (see annex M, instance 594) that supports residual axial load within an Electric_motor (see annex M, instance 391) that is in a Can (see annex M, instance 865).
1005	**Top_entry_mixer**	A Rotating_equipment (see annex M, instance 820) that is designed for use as a Mixer (see annex M, instance 410) and that is placed at the top of a Vessel (see annex M, instance 1113).
1006	**Top_pump_shaft**	A Shaft (see annex M, instance 978) that is located between a lower Pump_equipment (see annex M, instance 812) Shaft and a spacer on an Electric_motor (see annex M, instance 391) Shaft.
1007	**Triple_mechanical_seal**	A Mechanical_seal (see annex M, instance 942) that is a Dry_gas_seal (see annex M, instance 892) such that two Seals are needed to step down the pressure of the body of the fluid in equal stages. The third Seal is a back-up.
1008	**Vane**	An Equipment_component (see annex M, instance 594) that is a curved blade and that transfers energy between a fluid and a moving solid part.
1009	**Wear_ring**	A Rotating_equipment_component (see annex M, instance 966) that provides a replaceable leakage path between an Impeller (see annex M, instance 911) and a Casing (see annex M, instance 867).
1010	**Wet_bolting**	A Material_collection (see annex M, instance 546) that is one or more Bolts in contact with a liquid Process_material (see 4.2.136).

M.6.10 Specified instances of Class_of_material for Valves

Specified instances of Class_of_material that are Valves (see annex M, instance 1063) are defined in table M.27.

Table M.27 – Specified instances of Class_of_material for Valves

inst.	name	definition
1011	**Adjustable_choke_valve**	A Choke_valve (see annex M, instance 1020) that can have its operating pressure adjusted.
1012	**Angle_valve**	A Globe_valve (see annex M, instance 1032) that has ends an Angle_body (see annex M, instance 1067).
1013	**Balanced_safety_valve**	A Valve (see annex M, instance 1063) that is designed for use as a Safety_valve (see annex M, instance 463) and is such that back pressure exerts an equal force on the disc in both the opening and the closing directions.
1014	**Ball_check_valve**	A Lift_check_valve (see annex M, instance 1039) that has a free or spring loaded ball closing on a spherical seat.
1015	**Ball_valve**	A Valve (see annex M, instance 1063) that has a ball as a Closure_member (see annex M, instance 1068).
1016	**Ball_valve_with_integral_drain**	A Ball_valve (see annex M, instance 1015) that has a integral drain.
1017	**Barstock_valve**	A Valve (see annex M, instance 1063) that with a body machined from solid.
NOTE – A Barstock_valve is usually a Needle_valve (see annex M, instance 1043) or a Globe_valve (see annex M, instance 1032).		
1018	**Bursting_disc_relief_valve**	A Valve (see annex M, instance 1063) that is designed for use as a Relief_valve (see annex M, instance 461) and that operates when the pressure is sufficient to burst a disc.
1019	**Butterfly_valve**	A Valve (see annex M, instance 1063) that has a disc as a Closure_member (see annex M, instance 1068).
NOTE – The disc is usually mounted on a shaft.		
1020	**Choke_valve**	An Angle_valve (see annex M, instance 1012) that is designed for use as a Control_valve (see annex M, instance 446).

Table M.27 – Specified instances of Class_of_material for Valves (continued)

inst.	name	definition
1021	**Conduit_gate_valve**	A Parallel_gate_valve (see annex M, instance 1044) that has a continuous uninterrupted space through the Valve when fully open.
1022	**Conventional_relief_valve**	A Valve (see annex M, instance 1063) that is designed for use as a Relief_valve (see annex M, instance 461) and that has a Bonnet (see annex M, instance 586) vented to discharge fluid.
1023	**Diaphragm_valve**	A Valve (see annex M, instance 1063) that has a resilient diaphragm as the Closure_member (see annex M, instance 1068).
1024	**Double_disc_butterfly_-valve**	A Butterfly_valve (see annex M, instance 1019) that has two discs to isolate flow and pressure.
1025	**Double_disc_globe_valve**	A Globe_valve (see annex M, instance 1032) that has two discs to isolate flow and pressure.
1026	**Expanding_wedge_gate_-valve**	A Wedge_gate_valve (see annex M, instance 1064) that has two parallel faced gates separated by an expanding wedge that loads each gate against a fixed seat.
1027	**Fixed_choke_valve**	A Choke_valve (see annex M, instance 1020) that reduces a flow and pressure and that cannot be regulated.
1028	**Flap_valve**	A Swing_check_valve (see annex M, instance 1061) that operates at low pressure with a hinged disc or flap.
1029	**Float_valve**	A Valve (see annex M, instance 1063) that controls a liquid level by a float mechanism.
1030	**Float_valve_with_-mechanical_link**	A Float_valve (see annex M, instance 1029) that has a mechanical connection to the float.
1031	**Gate_valve**	A Valve (see annex M, instance 1063) that has a gate or disc Closure_member (see annex M, instance 1068) closing against flat seats located transverse to the piping axis. A Gate_valve has multi-turn operation with linear action.
1032	**Globe_valve**	A Valve (see annex M, instance 1063) that has a disc or piston Closure_member (see annex M, instance 1068) seating on a single flat or shaped seat. A Globe_valve has multi-turn operation with linear action.
1033	**Hand_operated_valve**	A Valve (see annex M, instance 1063) that is opened and closed manually.

Table M.27 – Specified instances of Class_of_material for Valves (continued)

inst.	name	definition
1034	**Hand_valve**	A Hand_operated_valve (see annex M, instance 1033) that has a small bore.
NOTE – A Hand_valve is often used in instrumentation.		
1035	**Hose_gate_valve**	A Gate_valve (see annex M, instance 1031) that has one externally threaded end.
1036	**Hose_globe_valve**	A Globe_valve (see annex M, instance 1032) that has one externally threaded end.
1037	**Jacketted_valve**	A Valve (see annex M, instance 1063) that has a jacket to isolate the Valve.
1038	**Knife_gate_valve**	A Gate_valve (see annex M, instance 1031) that is designed for use cutting through glutinous media or slurries and that has a narrow parallel gate with a shaped edge.
1039	**Lift_check_valve**	A Valve (see annex M, instance 1063) that is designed for use as a Check_valve (see annex M, instance 445) and that has the Closure_member (see annex M, instance 1068) lifted from the seat during forward flow.
1040	**Lock_up_valve**	A Valve (see annex M, instance 1063) that is designed for use as a Block_valve (see annex M, instance 442) and that has a small bore.
NOTE – A Lock_up_valve is often used in instrumentation.		
1041	**Manual_control_valve**	A Valve (see annex M, instance 1063) that is designed for use as a Control_valve (see annex M, instance 446) and that is operated by a person.
1042	**Motor_operated_valve**	A Valve (see annex M, instance 1063) that that is opened and closed by a motor.
1043	**Needle_valve**	A Globe_valve (see annex M, instance 1032) that has a conical plug (or needle) closing into a small seat.
NOTE – A Needle_valve is used for flow metering and for damping pressure fluctuations on instruments.		

Table M.27 – Specified instances of Class_of_material for Valves (continued)

inst.	name	definition
1044	**Parallel_gate_valve**	A Gate_valve (see annex M, instance 1031) that has a parallel slide gate or disc Closure_member (see annex M, instance 1068).
1045	**Parallel_plug_valve**	A Plug_valve (see annex M, instance 1050) that has a cylindrical plug closure.
1046	**Parallel_slide_valve**	A Gate_valve (see annex M, instance 1031) that has a spring-loaded double disc closure.
NOTE – A Parallel_slide_valve is used in power generation for steam service.		
1047	**Penstock_valve**	A Gate_valve (see annex M, instance 1031) that is a rectangular gate mounted in a frame fixed to a wall or bulkhead.
NOTE – A Penstock_valve is used to handle large volumes of water.		
1048	**Pinch_valve**	A Valve (see annex M, instance 1063) that consists of a flexible tube either exposed or enclosed in a body. The is pinched to close.
NOTE – The tube may be pinched either mechanically or by fluid pressure in the body.		
1049	**Piston_valve**	A Globe_valve (see annex M, instance 1032) that has a piston Closure_member (see annex M, instance 1068) entering or withdrawing from a seat bore to start, stop or regulate a flow.
NOTE – The seat bore or the piston contains Packing (see annex M, instance 980) to effect a seal.		
1050	**Plug_valve**	A Rotary_valve (see annex M, instance 1052) that has a quarter turn operation and that has a plug Closure_member (see annex M, instance 1068) sealing against a downstream seat.
1051	**Rotary_star_valve**	A Valve (see annex M, instance 1063) that has Vanes and that is designed to reduce a stream of solids.
1052	**Rotary_valve**	A Valve (see annex M, instance 1063) that has a rotary action.

Table M.27 – Specified instances of Class_of_material for Valves (continued)

inst.	name	definition
1053	**Slab_gate_valve**	A Conduit_gate_valve (see annex M, instance 1021) that has a single parallel sided gate. The gate is line pressure energised, with supplementary mechanical loading provided by springs for low pressure. A Slab_gate_valve is for small bores.
NOTE – The gate is normally sealed by floating seals. Fixed seats are sometimes used.		
1054	**Slide_valve**	A Parallel_gate_valve (see annex M, instance 1044) that has a slab design suitable for operation at high temperatures and low pressures.
1055	**Soft_seated_wedge_gate**	A Wedge_gate_valve (see annex M, instance 1064) that has primary soft seating.
1056	**Solenoid_valve**	A Valve (see annex M, instance 1063) that has a linear action and that is fitted with a solenoid for quick operation.
1057	**Solid_wedge_gate_valve**	A Wedge_gate_valve (see annex M, instance 1064) that has a solid wedge Closure_member (see annex M, instance 1068).
1058	**Split_wedge_gate_valve**	A Wedge_gate_valve (see annex M, instance 1064) that has a wedge Closure_member (see annex M, instance 1068) with two parts.
NOTE – A Split_wedge_gate_valve provides flexibility and resistance to thermal wedging.		
1059	**Spring_loaded_pressure_-relief_valve**	A Pressure_relief_valve (see annex M, instance 458) that uses a spring.
1060	**Subsea_choke_valve**	A Choke_valve (see annex M, instance 1020) that is designed for subsea service.
1061	**Swing_check_valve**	A Valve (see annex M, instance 1063) that is designed for use as a Check_valve (see annex M, instance 445) and that has a swinging disk that opens automatically.
1062	**Tank_valve**	A Valve (see annex M, instance 1063) that is designed for connection to a Tank (see annex M, instance 1108).
1063	**Valve**	A Piping_component (see annex M, instance 717) that is designed for use as a Valve_system (see annex M, instance 466) isolating, or controlling fluid flow direction or rate.

Table M.27 – Specified instances of Class_of_material for Valves (concluded)

inst.	name	definition
1064	**Wedge_gate_valve**	A Gate_valve (see annex M, instance 1031) that has a wedge Closure_member (see annex M, instance 1068).
1065	**Y_pattern_valve**	A Valve (see annex M, instance 1063) that is designed for use as a Diverter_valve (see annex M, instance 448) and that has a Valve body with the Closure_member (see annex M, instance 1068) at an angle to the port reducing pressure drop.
NOTE – A linear action Globe_valve (see annex M, instance 1032) or a Lift_check_valve (see annex M, instance 1039) may be a Y_pattern_valve.		

M.6.11 Specified instances of Class_of_material for Valve components

Specified instances of Class_of_material relevant to Valve (see annex M, instance 1063) components are defined in table M.28.

A Material classified by one of these instances of Class_of_Material is a component of a Valve or a component associated with a Valve.

NOTE – Some of the instances of Class_of_material in this table are defined in terms of the role played by a component or by its position in an assembly.

Table M.28 – Specified instances of Class_of_material for Valve components

inst.	name	definition
1066	**Actuator**	A Valve_component (see annex M, instance 1079) that is powered and that changes the position of a Valve (see annex M, instance 1063).
1067	**Angle_body**	A Valve_body (see annex M, instance 1080) that has an outlet and an inlet that do not face in opposite directions.
1068	**Closure_member**	A Valve_component (see annex M, instance 1079) that operates to regulate the flow or pressure.
1069	**Electrical_actuator**	A Non_manual_actuator (see annex M, instance 1075) that is driven by an electric motor or solenoid.
1070	**Hand_wheel**	A Material (see 4.2.110) that is a manually operated wheel intended to turn.
NOTE – A Hand_wheel can open and close a Valve (see annex M, instance 1063).		
1071	**Hydraulic_actuator**	A Non_manual_actuator (see annex M, instance 1075) that is driven by hydraulic power.
1072	**Hydraulic_coupler**	A Connector (see annex M, instance 542) that operates hydraulically.
1073	**Manual_actuator**	An Actuator (see annex M, instance 1066) that driven by human power.

Table M.28 – Specified instances of Class_of_material for Valve components (concluded)

inst.	name	definition
1074	**Motor_operated_actuator**	An Electrical_actuator (see annex M, instance 1069) that is driven by an electrical motor.
1075	**Non_manual_actuator**	An Actuator (see annex M, instance 1066) that is operated by non-human power.
1076	**Pneumatic_actuator**	A Non_manual_actuator (see annex M, instance 1075) that is operated by pneumatic power.
1077	**Positioner**	A Valve_component (see annex M, instance 1079) that is a servo mechanism to eliminate hysteresis of a stem.
1078	**Spring_controlled_-actuator**	A Non_manual_actuator (see annex M, instance 1075) that has spring acting as the trigger to open or close the Valve (see annex M, instance 1063).
1079	**Valve_component**	A Material (see 4.2.110) that is part of a Valve (see annex M, instance 1063).
1080	**Valve_body**	A Valve_component (see annex M, instance 1079) that is the main pressure containing component housing the working components.
1081	**Valve_bonnet**	A Valve_component (see annex M, instance 1079) that is the pressure containing top cover containing a Valve_gland (see annex M, instance 1082).
1082	**Valve_gland**	A Valve_component (see annex M, instance 1079) that compresses and retains a Packing (see annex M, instance 980) to prevent or leakage around a Valve stem.

M.6.12 Specified instances of Class_of_material for vessels

Specified instances of Class_of_material relevant to vessels (see annex M, instance 1113) are defined in table M.29.

Table M.29 – Specified instances of Class_of_material for vessels

inst.	name	definition
1083	**Atmospheric_storage_-tank**	A Tank (see annex M, instance 1108) that cannot withstand internal or external pressure.
1084	**Column**	A Vertical_vessel (see annex M, instance 1112) that enables chemical reactions or physical processes by means of differences in specific weight and heat input and/or medium flow.
1085	**Compartmented_vessel**	A Vessel (see annex M, instance 1113) that is sub-divided into compartments.
1086	**Conical_bottom_tank**	A Tank (see annex M, instance 1108) that has a Vessel_bottom (see annex M, instance 1199) with a conical shape.
1087	**Conical_roof_tank**	A Tank (see annex M, instance 1108) that has a roof with a conical shape.
1088	**Conical_separator**	A Vessel (see annex M, instance 1113) that is designed for use as a Separator (see annex M, instance 502) and that has a conical shape.
1089	**Dome_roof_tank**	A Tank (see annex M, instance 1108) that has a Dome_roof (see annex M, instance 1144).
1090	**Electrostatic_precipitator**	A Material (see 4.2.110) that is designed to remove small particles from a flow of gas by electrostatic forces.
1091	**Flanged_nozzle**	A Nozzle (see annex M, instance 569) that has a flanged end.
1092	**Floating_roof_tank**	A Tank (see annex M, instance 1108) that has a roof that floats on top of the liquid content.
1093	**Hopper**	A Vessel (see annex M, instance 1113) that has a conical shape for filling or dosing purposes.

Table M.29 – Specified instances of Class_of_material for vessels (continued)

inst.	name	definition
1094	**Horizontal_vessel**	A Vessel (see annex M, instance 1113) that is designed to be installed with the axis of its cylindrical part horizontal.
1095	**Horizontal_vessel_with_boot**	A Horizontal_vessel (see annex M, instance 1094) that has a Boot (see annex M, instance 1125) at its bottom.
1096	**Horizontal_vessel_with_dome**	A Horizontal_vessel (see annex M, instance 1094) that has a Dome (see annex M, instance 1143) at its top.
1097	**Instrument_nozzle**	A Nozzle (see annex M, instance 569) that is designed for use mounting an Instrument (see annex M, instance 140).
1098	**Integrally_reinforced_nozzle**	A Nozzle (see annex M, instance 569) that has sufficient wall thickness to compensate for weakening of the Vessel (see annex M, instance 1113).
1099	**Level_gauge_nozzle**	A Instrument_nozzle (see annex M, instance 1097) that is for mounting a Level_gauge (see annex M, instance 148).
1100	**Open_tank**	A Tank (see annex M, instance 1108) that has an open connection to the atmosphere.
1101	**Pressure_vessel**	A Vessel (see annex M, instance 1113) that can withstand a pressure greater that 1.013 bar A.
1102	**Refractory_lined_cyclone**	A Refractory_lined_vessel (see annex M, instance 1105) that is designed for use as a Cyclone (see annex M, instance 472).
1103	**Refractory_lined_separator**	A Refractory_lined_vessel (see annex M, instance 1105) that is designed for use as a Separator (see annex M, instance 502).
1104	**Refractory_lined_reactor**	A Refractory_lined_vessel (see annex M, instance 1105) that is designed for use as a Reactor (see annex M, instance 497).
1105	**Refractory_lined_vessel**	A Vessel (see annex M, instance 1113) that is heat protected by a Refractory_lining (see annex M, instance 1177).
1106	**Rotating_disc_contactor**	A Column (see annex M, instance 1084) that contains a rotating disk.
1107	**Spherical_vessel**	A Vessel (see annex M, instance 1113) that has the shape of a sphere.

Table M.29 – Specified instances of Class_of_material for vessels (concluded)

inst.	name	definition
1108	**Tank**	A Vessel (see annex M, instance 1113) that is vertical; that is cylindrical or square; and that has a flat or conical bottom.
1109	**Vacuum_column**	A Vertical_vessel (see annex M, instance 1112) that is designed to operate below atmospheric pressure, and that is designed by be used as a Column (see annex M, instance 1084).
1110	**Vacuum_equipment**	An Equipment (see annex M, instance 751) that is able to operate below atmospheric pressure.
1111	**Vacuum_vessel**	A Vessel (see annex M, instance 1113) that is able to operate below atmospheric pressure.
1112	**Vertical_vessel**	A Vessel (see annex M, instance 1113) that is designed to be installed with the axis of its cylindrical part vertical.
1113	**Vessel**	An Equipment (see annex M, instance 751) that is a container.
NOTES 1 – A Vessel may be an assembly that has a Bare_vessel (see annex M, instance 1120) as a part. 2 – A Vessel is designed for use storing or processing fluids of solids.		
1114	**Vessel_assembly**	An Equipment_assembly (see annex M, instance 752) that has a Vessel (see annex M, instance 1113) as the main component.
1115	**Welded_nozzle**	A Nozzle (see annex M, instance 569) that is designed to be welded to a Vessel (see annex M, instance 1113).

M.6.13 Specified instances of Class_of_material for Vessel components

Specified instances of Class_of_material relevant to Vessel (see annex M, instance 1113) components are defined in table M.30.

A Material classified by one of these instances of Class_of_Material is a component of a Vessel or a component associated with a Vessel.

NOTE – Some of the instances of Class_of_material in this table are defined in terms of the role played by a component or by its position in an assembly.

Table M.30 – Specified instances of Class_of_material for Vessel components

inst.	name	definition
1116	**Anchor_bolt**	A Bolt (see annex M, instance 1123) that fastens an Equipment (see annex M, instance 751) or a Base_plate (see annex M, instance 853) to its foundations, and that consists of a bar with one end embedded in the concrete and the other with a thread.
NOTE – The threaded end may be passed through a hole in a support that is then held down by a nut.		
1117	**Anchor_bolt_ring**	A Backing_ring (see annex M, instance 1118) that fastens a Vessel_skirt (see annex M, instance 1205) to a foundation.
1118	**Backing_ring**	A Ring (see annex M, instance 611) that is loose fitting and that sits behind a fixed ring.
1119	**Baffle_tray**	A Tray (see annex M, instance 1194) that guides fluid through a Column (see annex M, instance 1084) and that brings it into contact with gases whilst dropping from one tray to another.
1120	**Bare_vessel**	A Material (see 4.2.110) that is a container for a process medium that includes all parts normally welded to the container.
1121	**Base_ring**	A Material (see 4.2.110) that is a flange at the bottom of a Vessel (see annex M, instance 1113) and that is designed to support the Vessel.

Table M.30 – Specified instances of Class_of_material for Vessel components (continued)

inst.	name	definition
1122	**Berl_saddle**	A Vessel_packing (see annex M, instance 1204) that has the shape of a saddle.
1123	**Bolt**	A Material (see 4.2.110) that is a solid cylinder with a head of larger diameter at one end; that is threaded for all or part of its length; and that is designed to be used as a fastener when an Nut (see annex M, instance 1171) is screwed on to the threaded end.
1124	**Bolted_internal**	A Vessel_internal (see annex M, instance 1203) that is designed for bolted connection.
1125	**Boot**	A Material (see 4.2.110) that draws off a heavy phase.
1126	**Bubble_cap**	A Material (see 4.2.110) that creates an intense contact between gasses and fluids when passing a Tray (see annex M, instance 1194).
1127	**Bubble_cap_tray**	A Tray (see annex M, instance 1194) that creates an intense contact between gasses and fluids by guiding the gas through the fluid with an immersion device or cap after it has passed the Tray.
1128	**Calming_section_tray**	A Tray (see annex M, instance 1194) that create calm in a gas flow.
1129	**Ceramic_balls**	A Vessel_packing (see annex M, instance 1204) that is ceramic spheres.
1130	**Chimney_tray**	A Tray (see annex M, instance 1194) that guides a gas flow vertically upwards through small Pipes and thereby maintains a minimum level of fluid on the Tray.
1131	**Cladding**	A Protection_material (see annex M, instance 722) that is of metal with special properties to protect against attack by Process_material (see 4.2.136).
1132	**Clip**	A Equipment_component (see annex M, instance 594) that fixes of auxiliaries to Equipment.
1133	**Clean_out_door**	A Material (see 4.2.110) that allows the removal of debris from a Vessel (see annex M, instance 1113).

Table M.30 – Specified instances of Class_of_material for Vessel components (continued)

inst.	name	definition
1134	**Conical_head**	A Vessel_head (see annex M, instance 1152) that has the shape of a truncated cone.
1135	**Conical_roof**	A Roof (see annex M, instance 1179) that has the shape of a cone.
1136	**Conventional_-downcomer_tray**	A Tray (see annex M, instance 1194) that has one or more downcomers of conventional design.
1137	**Demister**	A Vessel_internal (see annex M, instance 1203) that is designed to catch fluid droplets.
1138	**Demister_support_tray**	A Tray (see annex M, instance 1194) that to supports a Demister (see annex M, instance 1137).
1139	**Dip_pipe**	A Vessel_internal (see annex M, instance 1203) that is a vertical pipe designed to be partly dipped into a liquid.
1140	**Disc_and_doughnut_tray**	A Tray (see annex M, instance 1194) that has the shape of a disc and a doughnut.
1141	**Dished_head**	A Vessel_head (see annex M, instance 1152) that has the shape of a dish.
1142	**Distributor_tray**	A Tray (see annex M, instance 1194) that distributes fluid or gasses over a Vessel_packing (see annex M, instance 1204) in a Column (see annex M, instance 1084).
1143	**Dome**	A Material (see 4.2.110) that draws off a light phase.
1144	**Dome_roof**	A Roof (see annex M, instance 1179) that has an elliptical shape.
1145	**Downcomer**	A Vessel_internal (see annex M, instance 1203) that guides fluid from one Tray (see annex M, instance 1194) to another and that has constant section dimensions.
1146	**Earthing_lug**	An Equipment_component (see annex M, instance 594) that is designed to connect an earthing conductor.
1147	**Ellipsoidal_head**	A Vessel_head (see annex M, instance 1152) that has a shape of an ellipsoid.

Table M.30 – Specified instances of Class_of_material for Vessel components (continued)

inst.	name	definition
1148	**Fire_proofing_support_-clip**	A Clip (see annex M, instance 1132) that intended to support fire proofing Vessel_externals (see annex M, instance 1200).
1149	**Flat_head**	A Vessel_head (see annex M, instance 1152) that is flat.
1150	**Grid_tray**	A Support_tray (see annex M, instance 1190) that supports Vessel_packing (see annex M, instance 1204).
1151	**Handhole**	A Nozzle (see annex M, instance 569) that allows hands to be inserted into a Vessel (see annex M, instance 1113).
1152	**Vessel_head**	A Material (see 4.2.110) that closes a cylindrical Shell (see annex M, instance 1181).
1153	**Hemispherical_head**	A Vessel_head (see annex M, instance 1152) that has the shape of a hemisphere.
1154	**Inlet_internal**	A Vessel_internal (see annex M, instance 1203) that is designed to facilitate an inlet operation.
1155	**Insulation_collar**	An Insulation_support (see annex M, instance 1156) that is a ring.
1156	**Insulation_support**	A Support (see annex M, instance 1189) that supports Material for thermal insulation.
1157	**Insulation_support_clip**	A Clip (see annex M, instance 1132) that supports Material for thermal insulation.
1158	**Insulation_support_ring**	An Insulation_support (see annex M, instance 1156) that has an annular shape.

Table M.30 – Specified instances of Class_of_material for Vessel components (continued)

inst.	name	definition
1159	**Ladder**	A Material (see 4.2.110) that allows access to different parts or levels of Equipment.
1160	**Ladder_support_clip**	A Clip (see annex M, instance 1132) that fastens a Ladder (see annex M, instance 1159).
1161	**Leg**	A Support (see annex M, instance 1189) that consists of vertical bars enabling a Vessel to rest upon a foundation.
1162	**Lifting_device**	A Material (see 4.2.110) that is designed to lift an Equipment (see annex M, instance 751) or a part of an Equipment.
1163	**Loose_internal**	A Vessel_internal (see annex M, instance 1203) that is designed not to be fixed to a Vessel (see annex M, instance 1113).
1164	**M_cap_tray**	A Tray (see annex M, instance 1194) that has bubble caps with an M-shaped section.
1165	**Reflux_elbow**	An Elbow (see annex M, instance 691) that transports a reflux fluid on a reflux tray.
1166	**Reflux_spider**	A Vessel_internal (see annex M, instance 1203) that is designed to distribute reflux fluid evenly.
1167	**Manhole**	A Nozzle (see annex M, instance 569) that is of sufficient size to allow a person to enter a Vessel.
1168	**Manhole_with_jacket**	A Manhole (see annex M, instance 1167) that is an assembly of a Manhole and a Jacket.
1169	**Name_plate**	An Equipment_component (see annex M, instance 594) that carries information about an Equipment (see annex M, instance 751) item.
1170	**Nozzle_reinforcing_pad**	A Material (see 4.2.110) that is required by code for vessel opening reinforcement.
1171	**Nut**	A Material (see 4.2.110) that is a small block, that has a threaded hole and and that is designed to be used as a fastener when screwed on to a threaded Stud (see annex M, instance 1188) or Bolt (see annex M, instance 1123).

Table M.30 – Specified instances of Class_of_material for Vessel components (continued)

inst.	name	definition
1172	**Partial_draw_off_tray**	A Tray (see annex M, instance 1194) that supports the partial draw off of a fluid from a Column (see annex M, instance 1084).
1173	**Plate_settler**	A Vessel_internal (see annex M, instance 1203) that uses flat plates to prevent mixing.
1174	**Platform**	A Material (see 4.2.110) that is a structure attached to an Equipment (see annex M, instance 751) in order to allow access and maintenance.
1175	**Platform_support**	A Clip (see annex M, instance 1132) that supports a Platform (see annex M, instance 1174).
1176	**Polypropylene_wool**	A Vessel_packing (see annex M, instance 1204) that is made of polypropylene and has the consistency of wool.
1177	**Refractory_lining**	A Vessel_internal (see annex M, instance 1203) that is designed to protect the Vessel from the heat of the contained Material.
1178	**Reinforcing_ring**	An Equipment_component (see annex M, instance 594) that is required by code for reinforcement of a circular part.
1179	**Roof**	A Material (see 4.2.110) that covers a Tank (see annex M, instance 1108) or other Material.
1180	**Saddle**	A Support (see annex M, instance 1189) that has the shape of a saddle.

Table M.30 – Specified instances of Class_of_material for Vessel components (continued)

inst.	name	definition
1181	**Shell**	A Material (see 4.2.110) that is the cylindrical part of a Vessel (see annex M, instance 1113).
1182	**Shell_flange**	A Material (see 4.2.110) that is a flange of a Shell (see annex M, instance 1181).
1183	**Sieve_tray**	A Tray (see annex M, instance 1194) that uses holes to allow vapour flow.
1184	**Sloped_downcomer**	A Downcomer (see annex M, instance 1145) that guides fluid from one Tray (see annex M, instance 1194) to another by means of gravity and has a continuously decreasing section dimensions.
1185	**Stepped_downcomer**	A Downcomer (see annex M, instance 1145) that that guides fluid from one Tray (see annex M, instance 1194) to another by means of gravity and that has two different section dimensions.
1186	**Straight_downcomer**	A Downcomer (see annex M, instance 1145) that that guides fluid from one Tray (see annex M, instance 1194) to another by means of gravity and that has constant section dimensions.
1187	**Structured_packing**	A Vessel_packing (see annex M, instance 1204) that fills the internal space of a Column (see annex M, instance 1084) between Trays (see annex M, instance 1194) with one packing body.
1188	**Stud**	A Material (see 4.2.110) that is a projection from the surface of a larger Material and that is used for locating of fastening.
1189	**Support**	A Material (see 4.2.110) that intended to support other Material.
1190	**Support_tray**	A Vessel_internal (see annex M, instance 1203) that is intended to bear other Vessel_internals.
1191	**Thermowell**	A Material (see 4.2.110) that enables the mounting of a temperature measurement device.
1192	**Torispherical_head**	A Vessel_head (see annex M, instance 1152) that has the shape of a torisphere.
1193	**Total_draw_off_tray**	A Tray (see annex M, instance 1194) that removes all liquid.
1194	**Tray**	A Vessel_internal (see annex M, instance 1203) that regulates counter current flow of phases and improves contact between phases.

Table M.30 – Specified instances of Class_of_material for Vessel components (concluded)

inst.	name	definition
1195	**Tray_valve**	An Vessel_internal (see annex M, instance 1203) that prevents liquid from flowing down from a Tray (see annex M, instance 1194) whilst still allowing the vapour to flow upward.
1196	**Unstructured_packing**	A Vessel_packing (see annex M, instance 1204) that that fills the internal space of a Column (see annex M, instance 1084) between Trays (see annex M, instance 1194) with loose packing bodies.
1197	**V-grid_tray**	A Tray (see annex M, instance 1194) that has bubble caps or valves that V-shaped in a top view.
1198	**Valve_tray**	A Tray (see annex M, instance 1194) that has a bubbling area consisting of a sheet perforated with holes in which valves are placed.
1199	**Vessel_bottom**	A Vessel_head (see annex M, instance 1152) that is the lower Vessel_head in a vertical Vessel (see annex M, instance 1113).
1200	**Vessel_external**	A Material (see 4.2.110) that is designed to be mounted on the outside of a Bare_Vessel (see annex M, instance 1120).
1201	**Vessel_davit**	A Material (see 4.2.110) that is designed to lift and/or transport a Vessel_external (see annex M, instance 1200).
1202	**Vessel_davit_support_clip**	A Clip (see annex M, instance 1132) that supports a Vessel_davit (see annex M, instance 1201).
1203	**Vessel_internal**	A Material (see 4.2.110) that is situated inside a Bare_vessel (see annex M, instance 1120) but is not part of the Bare_vessel.
1204	**Vessel_packing**	A Vessel_internal (see annex M, instance 1203) that provides a large surface to improve mass transfer between two phases.
1205	**Vessel_skirt**	A Support (see annex M, instance 1189) that transfers load from a Vertical_vessel (see annex M, instance 1112) to foundations.
1206	**Vortex_breaker**	A Vessel_internal (see annex M, instance 1203) that is designed to prevent the occurrence of a vortex in a fluid.
1207	**Welded_internal**	A Vessel_internal (see annex M, instance 1203) that is designed to be welded to a Vessel (see annex M, instance 1113).

M.6.14 Specified instances of Class_of_material for Physical_information_carrier

Specified instances of Class_of_material relevant to Physical_information_carriers (see 4.2.124) are defined in table M.31.

Table M.31 – Specified instances of Class_of_material for Physical_information_carrier

inst.	name	definition
1208	**A0_document**	A Document (see annex M, instance 1213) that is A0 size.
1209	**A1_document**	A Document (see annex M, instance 1213) that is A1 size.
1210	**A2_document**	A Document (see annex M, instance 1213) that is A2 size.
1211	**A3_document**	A Document (see annex M, instance 1213) that is A3 size.
1212	**A4_document**	A Document (see annex M, instance 1213) that is A4 size.
1213	**Document**	A Physical_information_carrier (see 4.2.124) that is one or more sheets of paper supporting areas of colour or shading intended to be interpreted by a person.
1214	**Drawing**	A Document (see annex M, instance 1213) that is subject to version control as an engineering drawing.
NOTE – A Drawing usually presents information by graphics as well as by text.		
1215	**Drawing_sheet**	A Document (see annex M, instance 1213) that is a single sheet of a Drawing (see annex M, instance 1214).
1216	**Landscape_format_document**	A Document (see annex M, instance 1213) that is intended to be viewed by a person with the long dimension horizontal.
1217	**Portrait_format_document**	A Document (see annex M, instance 1213) that is intended to be viewed by a person with the long dimension vertical.

M.7 Specified instances of Class_of_property

The specified instances of Class_of_property (see 4.2.31) are defined in tables in clause M.7.

NOTE 1 – Each instance of the AIM entity **standard_class_of_property** (see 5.2.3.159) has a **name** attribute inherited from **group**.

This attribute is one of the keywords listed in the 'name' column of the tables in clause M.7 and indicates the corresponding specified instance of Class_of_property.

The specified instances of Class_of_property are defined in terms of a specific application object as follows:

– a Property of a Material (see 4.2.110) object; and

EXAMPLE 269 – The Temperature of 440 deg C and the Pressure of 15 bar gauge are Properties that may be possessed by a Material.

– a Property of an Activity (see 4.2.7).

EXAMPLE 270 – The Mass_flow_rate of 100 tonnes per hour is a Property that may be possessed by an Activity.

The specified instances of Class_of_property, for a Property that is possessed by a Material object, are defined in terms of a specific classes of Material object as follows:

– a Property of any Material;

EXAMPLE 271 – The Temperature of 440 deg C is a Properties that may be possessed by a Material (see 4.2.110) that is an Equipment (see annex M, instance 751) or by a fluid Process_material (see 4.2.136).

– a Property of a Material plant item; and

This is a Property that is of a Material that performs an Activity within a process plant.

EXAMPLE 272 – The Internal_volume of 10 m^3 may be possessed by an Equipment such as a Vessel (see annex M, instance 1113), but not by a fluid.

– a Property of a Process_material (see 4.2.136).

This is a Property that is of a Material that is processed by an Activity within a process plant.

EXAMPLE 273 – The Pressure of 15 bar gauge may be possessed by a fluid, but not an Equipment.

NOTES

2 – A Property that is of a class defined in terms of one application object or Class_of_material, may be possessed by an object of a different class.

3 – It is process industry practice to associate fluid Properties with an Equipment (say) to convey information about the fluids that may be processed by the Equipment. This practice is supported by this part of ISO 10303.

A Property that is of a class defined in terms of one application object or Class_of_material, and is possessed by an object of a different class, shall be interpreted as follows:

– a Property of a class defined in terms of an Activity, and possessed by a Material plant item;

The possession by a Material plant item of a Property defined in terms of an Activity, indicates that the Property is of an Activity that the Material plant item has the ability to perform.

NOTE 4 – This possession does not indicate that the Property is of an Activity the Material plant item actually performs, or is intended to perform, when it provides the resource for a particular Facility.

EXAMPLE 274 – The Normal_operating_mass_flow_rate of 100 tonnes per hour possessed by an Equipment indicates that the Equipment may transfer Material at a rate of 100 tonnes per hour when in normal operation.

Such an Equipment may provide the resource for a Facility that transfers Material at a rate of 90 tonnes per hour when in normal operation.

– a Property of a class defined in terms of a Process_material, and possessed by a Material plant item;

The possession by a Material plant item of a Property defined in terms of a Process_material, indicates that the Property is of a Process_material that the Material plant item has the ability to process.

NOTE 5 – This possession does not indicate that the Property is of a Process_material that the Material plant item actually processes, or is intended to process, when it provides the resource for a particular Facility.

EXAMPLE 275 – The Normal_operating_pressure of 15 bar gauge possessed by an Equipment indicates that the Equipment may process Material with a Pressure of 15 bar gauge when in normal operation.

Such an Equipment may provide the resource for a Facility that processes Material with a Pressure of 12 bar gauge when in normal operation.

– a Property of class defined in terms of an Activity, and possessed by a Facility;

The possession by a Facility of a Property defined in terms of an Activity, indicates that the Property is possessed by an Activity that the Facility actually performs, or is intended to perform.

NOTE 6 – This possession does not indicate that the Property is possessed by an Activity that a Material plant item providing the resource for the Facility has the ability to perform.

EXAMPLE 276 – The Normal_operating_mass_flow_rate of 90 tonnes per hour possessed by a Facility indicates that the Facility transfers Material at a rate of 90 tonnes per hour when in normal operation.

A Material that provides the resource for such a Facility may be able to transfer Material at a rate of 100 tonnes per hour when in normal operation.

– a Property of a class defined in terms of a Process_material, and possessed by a Facility.

The possession by a Facility of a Property defined in terms of a Process_material, indicates that the Property is possessed by a Process_material that the Facility actually processes, or is intended to process.

NOTE 7 – This possession does not indicate that the Property is possessed by a Process_material that a Material plant item providing the resource for the Facility has the ability to process.

EXAMPLE 277 – The Normal_operating_pressure of 12 bar gauge possessed by a Facility indicates that the Facility processes Material with a Pressure of 12 bar gauge when in normal operation.

A Material that provides the resource for such a Facility may be able to process Material with a Pressure of 15 bar gauge when in normal operation.

The Process_material may be either a Typical_object (see 4.2.178) or a Specific_object (see 4.2.168).

NOTES

8 – A Process_material that is associated with a Material or Facility as a design condition is usually a Typical_object that may be processed at some time, rather than Specific_object that is a particular intended batch.

9 – A typical Process_material that is associated with a Material or Facility is sometimes called a 'stream design case'.

EXAMPLE 278 – The Normal_operating_pressure of 12 bar gauge possessed by a typical Process_material indicates that the Process_material has that pressure when the process plant is in normal operation.

NOTE 10 – A Facility or Material plant item is associated with a Process_material through an Activity, as follows:

– a Facility or Material is associated with an Activity by an instance of Involvement_of_object_in_activity (see 4.2.103) that is classified as Performer (see annex M, instance 537);

– a Process_material is associated with the same Activity by an instance of Involvement_of_object_in_activity (see 4.2.103) that is classified as Input_material (see annex M, instance 533) or Output_material (see annex M, instance 536).

The Activity that makes the link is classified as Transfer_material (see annex M, instance 3), Transform_material (see annex M, instance 4) or both.

M.7.1 Specified instances of Class_of_property for Material and Activity

The specified instances of Class_of_property (see 4.2.31) for Material and Activity are defined in table M.32.

Table M.32 – Specified instances of Class_of_property

inst.	name	definition
1218	**Absorbed_power_at_-rated_capacity**	A Power (see annex M, instance 1269) that is the rate of input of mechanical energy to a Driven_equipment (see annex M, instance 784) at the reference steady state used to describe a duty that may be performed. This is a Property of an Activity. Its possession by an Equipment indicates a duty that may be performed by an Equipment.
NOTE – The set of 'rated' Properties for an Equipment are all for the same reference steady state conditions.		
1219	**Adiabatic_power_at_-rated_capacity**	A Power (see annex M, instance 1269) that is the rate of work done in adiabatic compression of a gas by a Compressor_system (see annex M, instance 377) or Compressor_equipment (see annex M, instance 777) at the reference steady state used to describe a duty that may be performed. This is a Property of an Activity. Its possession by an Equipment indicates a duty that may be performed by an Equipment.
NOTE – The set of 'rated' Properties for an Equipment are all for the same reference steady state conditions.		
1220	**Density**	A Property that is a mass per unit volume (dimension ML^{-3}).
NOTE – Specific circumstances in which a Density is possessed by a Process_material are indicated by the classes Density_at_maximum_operating_temperature (see annex M, instance 1221), Density_at_minimum_-operating_temperature (see annex M, instance 1222), and Normal_operating_density (see annex M, instance 1257).		

Table M.32 – Specified instances of Class_of_property (continued)

inst.	name	definition
1221	**Density_at_maximum_-operating_temperature**	A Density (see annex M, instance 1220) that is possessed by a fluid at Maximum_operating_temperature (see annex M, instance 1246) This is a Property of a Process_material.
1222	**Density_at_minimum_-operating_temperature**	A Density (see annex M, instance 1220) that is possessed by a fluid at Minimum_operating_temperature (see annex M, instance 1254) This is a Property of a Process_material.
1223	**Differential_head_at_-rated_capacity**	A Pressure (see annex M, instance 1270) that is the difference maintained between the Suction_port (see annex M, instance 31) and the Discharge_port (see annex M, instance 19) at the reference steady state used to describe a duty that may be performed by a Pump_system (see annex M, instance 420), Pump_equipment (see annex M, instance 812, Compressor_-system (see annex M, instance 377) or Compressor_equipment (see annex M, instance 777). This is a Property of an Activity. Its possession by an Equipment indicates a duty that may be performed by an Equipment.
NOTE – The set of 'rated' Properties for an Equipment are all for the same reference steady state conditions.		
1224	**Direction_of_rotation**	A Property that is the direction of rotation of a Shaft (see annex M, instance 978). A Direction_of_rotation is either Clockwise or Counter_-clockwise. The Direction_of_rotation shall be recorded such that a Clockwise rotation has a positive sense about an axis running along the shaft away from the driven end of the shaft. This is a Property of a Material plant item.
1225	**Flow_velocity**	A Property that is a velocity of flow (dimension LT^{-1}). A Flow_velocity shall be described by a positive Numeric_value whatever the direction of flow. This is a Property of a Process_material.
1226	**Frequency_of_rotation**	A Property that is a frequency of rotation (dimension T^{-1}). This is a Property of a Material plant item.

Table M.32 – Specified instances of Class_of_property (continued)

inst.	name	definition
1227	**Hydrostatic_test_pressure**	A Pressure (see annex M, instance 1270) that shall be imposed by a hydrostatic test. This is a Property of a Process_material. Its possession by an Equipment indicates the nature of a hydrostatic pressure test carried out on that equipment.
1228	**Hydrostatic_test_-temperature**	A Temperature (see annex M, instance 1276) that a hydrostatic pressure test shall be carried out at. This is a Property of a Process_material. Its possession by an Equipment indicates the nature of a hydrostatic pressure test carried out on that equipment.
1229	**Internal_volume**	A Volume (see annex M, instance 1277) that is an internal capacity. This is a Property of a Material plant item.
1230	**Kinematic_viscosity**	A Property that is a kinematic viscosity (dimension L^2T^{-1}).
NOTE – Specific circumstances in which a Kinematic_viscosity is possessed are indicated by the classes Normal_operating_kinematic_viscosity (see annex M, instance 1266), Kinematic_viscosity_at_maximum_-operating_temperature (see annex M, instance 1231), and Kinematic_viscosity_at_minimum_operating_-temperature (see annex M, instance 1232).		
1231	**Kinematic_viscosity_at_-maximum_operating_-temperature**	A Kinematic_viscosity (see annex M, instance 1230) that is possessed by a liquid at Maximum_operating_temperature (see annex M, instance 1246). This is a Property of a Process_material.
1232	**Kinematic_viscosity_at_-minimum_operating_-temperature**	A Kinematic_viscosity (see annex M, instance 1230) that is possessed by a liquid at Minimum_operating_temperature (see annex M, instance 1254). This is a Property of a Process_material.
1233	**Mass**	A Property that is a mass (dimension M).
NOTE – Some Equipment may possess different instances of Mass in different states. For such Equipment, a Mass of a class such as Mass_empty (see annex M, instance 1234) or Mass_with_water (see annex M, instance 1236) may be recorded.		
1234	**Mass_empty**	A Mass (see annex M, instance 1233) that is possessed by an Equipment (see annex M, instance 751) when empty of Process_material (see 4.2.136). This is a Property of a Material plant item.
1235	**Mass_flow_rate**	A Property that is a rate of flow of mass (dimension MT^{-1}). This is a Property of an Activity.

Table M.32 – Specified instances of Class_of_property (continued)

inst.	name	definition
1236	**Mass_with_water**	A Mass (see annex M, instance 1233) that is possessed by an Equipment (see annex M, instance 751) when full of water. This is a Property of a Material plant item.
1237	**Maximum_design_flow_-velocity**	A Flow_velocity (see annex M, instance 1225) that is the maximum possessed in any possible state. This is a Property of a Process_material.
NOTES 1 – A Flow_velocity possessed in any possible state in less than or equal to the maximum. 2 – A Maximum_design_flow_velocity for a Facility (see 4.2.89) may be predicted by simulating possible trips, excursions and fault states.		
1238	**Maximum_design_-pressure**	A Pressure (see annex M, instance 1270) that is the maximum possessed in any possible state. This is a Property of a Process_material.
NOTES 3 – A Pressure possessed in any possible state in less than or equal to the maximum. 4 – A Maximum_design_pressure for a Facility (see 4.2.89) may be predicted by simulating possible trips, excursions and fault states.		
1239	**Maximum_design_-temperature**	A Temperature (see annex M, instance 1276) that is the maximum possessed in any possible state. This is a Property of a Process_material.
NOTES 5 – A Temperature possessed in any possible state in less than or equal to the maximum. 6 – A Maximum_design_temperature for a Facility (see 4.2.89) may be predicted by simulating possible trips, excursions and fault states.		
1240	**Maximum_operating_-absorbed_power**	A Power (see annex M, instance 1269) that is the maximum rate of input of mechanical energy to a Driven_equipment (see annex M, instance 784), at any steady state during normal operation. This is a Property of an Activity. Its possession by an Equipment indicates a duty that may be performed by an Equipment.
NOTE – For a Centrifugal_pump (see annex M, instance 774) this is the Power absorbed with the actual Impeller.		

Table M.32 – Specified instances of Class_of_property (continued)

inst.	name	definition
1241	**Maximum_operating_-flow_velocity**	A Flow_velocity (see annex M, instance 1225) that is the maximum possessed in any steady state during normal operation. This is a Property of a Process_material.
1242	**Maximum_operating_-mass**	A Mass (see annex M, instance 1233) that is the maximum possessed in any steady state during normal operation. This is a Property of a Material plant item. For an Equipment (see annex M, instance 751) that may contain Process_material (see 4.2.136), the mass of the Process_material is included.
1243	**Maximum_operating_-mass_flow_rate**	A Mass_flow_rate (see annex M, instance 1235) that is the maximum possessed in any steady state during normal operation. This is a Property of an Activity.
1244	**Maximum_operating_-pressure**	A Pressure (see annex M, instance 1270) that is the maximum possessed in any steady state during normal operation. This is a Property of a Process_material.
1245	**Maximum_operating_-shaft_speed**	A Frequency_of_rotation (see annex M, instance 1226) that is the maximum Shaft speed in any steady state during normal operation. A shaft speed shall be described by a positive Numeric_value whatever the sense of the Direction_of_rotation (see annex M, instance 1224). This is a Property of a Material plant item.
1246	**Maximum_operating_-temperature**	A Temperature (see annex M, instance 1276) that is the maximum possessed in any steady state during normal operation. This is a Property of a Process_material.
1247	**Maximum_operating_-volume_of_contained_-liquid**	A Volume (see annex M, instance 1277) that is the maximum possessed by the contained liquid in any steady state during normal operation. This is a Property of a Process_material.
1248	**Maximum_operating_-volumetric_flow_rate**	A Volumetric_flow_rate (see annex M, instance 1278) that is the maximum possessed in any steady state during normal operation. This is a Property of an Activity.

Table M.32 – Specified instances of Class_of_property (continued)

inst.	name	definition
1249	**Molar_mass**	A Property that is the a Mass (see annex M, instance 1233) of one Mole of substance. This is a Property of a Process_material.
1250	**Minimum_design_-pressure**	A Pressure (see annex M, instance 1270) that is the minimum possessed in any possible state. This is a Property of a Process_material.
NOTES 1 – A Pressure possessed in any possible state is greater than or equal to the minimum. 2 – A Minimum_design_pressure for a Facility (see 4.2.89) may be predicted by simulating possible trips, excursions and fault states.		
1251	**Minimum_design_-temperature**	A Temperature (see annex M, instance 1276) that is the minimum possessed in any possible state. This is a Property of a Process_material.
NOTES 3 – A Temperature possessed in any possible state is greater than or equal to the minimum. 4 – A Minimum_design_temperature for a Facility (see 4.2.89) may be predicted by simulating possible trips, excursions and fault states.		
1252	**Minimum_operating_-mass_flow_rate**	A Mass_flow_rate (see annex M, instance 1235 that is the minimum possessed in any steady state during normal operation. This is a Property of an Activity.
1253	**Minimum_operating_-pressure**	A Pressure (see annex M, instance 1270) that is the minimum possessed in any steady state during normal operation. This is a Property of a Process_material.
1254	**Minimum_operating_-temperature**	A Temperature (see annex M, instance 1276) that is the minimum possessed in any steady state during normal operation. This is a Property of a Process_material.
1255	**Minimum_operating_-volume_of_contained_-liquid**	A Volume (see annex M, instance 1277) that is the minimum possessed by the contained liquid in any steady state during normal operation. This is a Property of a Process_material.

Table M.32 – Specified instances of Class_of_property (continued)

inst.	name	definition
1256	**Minimum_operating_-volumetric_flow_rate**	A Volumetric_flow_rate (see annex M, instance 1278) that is the minimum possessed in any steady state during normal operation. This is a Property of an Activity.
1257	**Normal_operating_-density**	A Density (see annex M, instance 1220) that is possessed by a Material at a steady state during normal operation. This is a Property of a Process_material.
NOTE – A Normal_operating_density may by a Property of a Material in any Phase (see 4.2.123).		
1258	**Normal_operating_flow_-velocity**	A Flow_velocity (see annex M, instance 1225) that is possessed at a steady state during normal operation. This is a Property of a Process_material.
NOTE – A Normal_operating_flow_velocity for a Facility (see 4.2.89) may be deemed as part of a Design (see annex M, instance 2) Activity or predicted by simulation.		
1259	**Normal_operating_mass**	A Mass (see annex M, instance 1233) that is possessed at a steady state during normal operation. This is a Property of a Material plant item or of a batch of Process_material. For an Equipment (see annex M, instance 751) that may contain Process_material (see 4.2.136), the mass of the Process_material is included.
1260	**Normal_operating_mass_-flow_rate**	A Mass_flow_rate (see annex M, instance 1235) that is possessed at a steady state during normal operation. This is a Property of an Activity.
NOTE – A Normal_operating_mass_flow_rate for a Facility (see 4.2.89) may be deemed as part of a Design (see annex M, instance 2) Activity or predicted by simulation.		
1261	**Normal_operating_-pressure**	A Pressure (see annex M, instance 1270) that is possessed at a steady state during normal operation. This is a Property of a Process_material.
NOTE – A Normal_operating_pressure for a Facility (see 4.2.89) may be deemed as part of a Design (see annex M, instance 2) Activity or predicted by simulation.		
1262	**Normal_operating_shaft_-power**	A Power (see annex M, instance 1269) that is transmitted along a Shaft (see annex M, instance 978) during normal operation. This is a Property of an Activity.
1263	**Normal_operating_-surface_tension**	A Surface_tension (see annex M, instance 1275) possessed by a liquid at a steady state during normal operation (dimension MT^{-2}). This is a Property of a Process_material.

Table M.32 – Specified instances of Class_of_property (continued)

inst.	name	definition
1264	**Normal_operating_-temperature**	A Temperature (see annex M, instance 1276) that is possessed at a steady state during normal operation. This is a Property of a Process_material.
NOTE – A Normal_operating_temperature for a Facility (see 4.2.89) may be deemed as part of a Design (see annex M, instance 2) Activity or predicted by simulation.		
1265	**Normal_operating_-volumetric_flow_rate**	A Volumetric_flow_rate (see annex M, instance 1278) that is possessed at a steady state during normal operation. This is a Property of an Activity.
NOTE – A Normal_operating_volumetric_flow_rate for a Facility (see 4.2.89) may be deemed as part of a Design (see annex M, instance 2) Activity or predicted by simulation.		
1266	**Normal_operating_-kinematic_viscosity**	A Kinematic_viscosity (see annex M, instance 1230) that is possessed by a liquid at steady state during normal operation. This is a Property of a Process_material.
1267	**Normal_operating_-volume_of_contained_-liquid**	A Volume (see annex M, instance 1277) that is possessed by the contained liquid at a steady state during normal operation. This is a Property of a Process_material.
NOTE – A Normal_operating_volume_of_contained_liquid for a Facility (see 4.2.89) may be deemed as part of a Design (see annex M, instance 2) Activity or predicted by simulation.		
1268	**NPSH_at_rated_capacity**	A Pressure (see annex M, instance 1270) that is at the amount by which that absolute Pressure at the Suction_port (see annex M, instance 31) of a Pump_system (see annex M, instance 420) or Pump_equipment (see annex M, instance 812) exceeds the vapour Pressure of a pumped liquid at the reference steady state used to describe a duty that may be performed. This is a Property of a Process_material. Its possession by an Equipment indicates a duty that may be performed by an Equipment.
NOTES 1 – The set of 'rated' Properties for an Equipment are all for the same reference steady state conditions. 2 – An NPSH_at_rated_capacity is usually expressed as a head of the pumped liquid.		

Table M.32 – Specified instances of Class_of_property (continued)

inst.	name	definition
1269	**Power**	A Property that is a power (dimension ML^2T^{-3}). This is a Property of an Activity.
NOTE – Specific circumstances in which a Power is possessed by an Activity are indicated by the classes Absorbed_power_at_rated_capacity (see annex M, instance 1218), Adiabatic_power_at_rated_capacity (see annex M, instance 1219), and Normal_operating_shaft_power (see annex M, instance 1262).		
1270	**Pressure**	A Property that is a pressure (dimension $ML^{-1}T^{-2}$).
NOTE – Specific circumstances in which a Pressure is possessed by a Process_material are indicated by the classes Normal_operating_pressure (see annex M, instance 1261), Maximum_operating_pressure (see annex M, instance 1244), Minimum_operating_pressure (see annex M, instance 1253), Maximum_design_pressure (see annex M, instance 1238), Minimum_design_pressure (see annex M, instance 1250), Hydrostatic_test_pressure (see annex M, instance 1227), and NPSH_at_rated_capacity (see annex M, instance 1268).		
1271	**Pump_efficiency_at_-rated_capacity**	A Property that is a ratio and that is the rate of work done in displacement of a liquid divided by rate of mechanical energy input at the reference steady state used to describe a duty performed by a Pump_system (see annex M, instance 420) or Pump_equipment (see annex M, instance 812). This is a Property of an Activity. Its possession by an Equipment indicates a duty that may be performed by an Equipment.
NOTE – The set of 'rated' Properties for an Equipment are all for the same reference steady state conditions.		
1272	**Rated_mass_flow**	A Mass_flow_rate (see annex M, instance 1235) that is possessed at the reference steady state used to describe a duty that may be performed by an Equipment (see annex M, instance 751). This is a Property of an Activity. Its possession by an Equipment indicates a duty that may be performed by an Equipment.
NOTE – The set of 'rated' Properties for an Equipment are all for the same reference steady state conditions.		

Table M.32 – Specified instances of Class_of_property (concluded)

inst.	name	definition
1273	**Rated_shaft_speed**	A Frequency_of_rotation (see annex M, instance 1226) that is the Shaft speed at the reference steady state used to describe a duty that may be performed by an Equipment (see annex M, instance 751). A shaft speed shall be described by a positive Numeric_value whatever the sense of the Direction_of_rotation (see annex M, instance 1224). This is a Property of a Material plant item.
NOTE – The set of 'rated' Properties for an Equipment are all for the same reference steady state conditions.		
1274	**Specific_heat**	A Property that is a ratio and that is the thermal capacity of a Material divided by the thermal capacity of water where both the substance and water are at 15 degrees Celcius. This is a Property of a Process_material.
1275	**Surface_tension**	A Property that is the membrane force per unit length in the surface of a liquid (dimension MT^{-2}). This is a Property of a Process_material.
1276	**Temperature**	A Property that is a temperature.
NOTE – Specific circumstances in which a Temperature is possessed are indicated by the classes Normal_operating_temperature (see annex M, instance 1264), Maximum_operating_temperature (see annex M, instance 1246), Minimum_operating_temperature (see annex M, instance 1254), Maximum_design_temperature (see annex M, instance 1239), Minimum_design_temperature (see annex M, instance 1251), and Hydrostatic_test_temperature (see annex M, instance 1228).		
1277	**Volume**	A Property that is a volume.
NOTE – Specific circumstances in which a Volume is possessed are indicated by the classes Normal_operating_volume_of_contained_liquid (see annex M, instance 1267), Maximum_operating_volume_of_contained_liquid (see annex M, instance 1247), Minimum_operating_volume_of_contained_liquid (see annex M, instance 1255), and Internal_volume (see annex M, instance 1229).		
1278	**Volumetric_flow_rate**	A Property that is a rate of flow of volume (dimension M^3T^{-2}).
NOTE – Specific circumstances in which a Volumetric_flow_rate is possessed are indicated by the classes Maximum_operating_volumetric_flow_rate (see annex M, instance 1248), Minimum_operating_volumetric_flow_rate (see annex M, instance 1256), and Normal_operating_volumetric_flow_rate (see annex M, instance 1265).		

M.7.2 Specified instances of Class_of_property for any composition

The specified instances of Class_of_property (see 4.2.31) for any composition are defined in table M.33. A composition is either an assembly (see 3.5.2) or a collection (see 3.5.5).

Table M.33 – Specified instances of Class_of_property for any composition

inst.	name	definition
1279	**Number_of_items**	A Property that is the number of items in a collected or assembled object.

M.7.3 Specified instances of Class_of_property for a Physical_information_carrier

The specified instances of Class_of_property (see 4.2.31) for a Physical_information_carrier (see 4.2.124) are defined in table M.34.

Table M.34 – Specified instances of Class_of_property for a Physical_information_carrier

inst.	name	definition
1280	**Colour**	A Property that is the spectral composition of emitted or reflected light.
NOTE – Standard enumerated Properties that are Colour are defined in M.37.		
1281	**Paper_height**	A Property that is the long dimension of a rectangular sheet of paper.
1282	**Paper_width**	A Property that is the short dimension of a rectangular sheet of paper.

M.8 Specified instances of Class_of_substance

The specified instances of Class_of_substance (see 4.2.32) are defined below.

NOTE – Each instance of the AIM entity **standard_class_of_material** (see 5.2.3.158) has a **name** attribute inherited from **group**.

This attribute is either:

- one of the keywords listed in the 'name' column of the tables in clause M.6 and indicates the corresponding specified instance of Class_of_material; or
- one of the keywords listed in the 'name' column of the tables in clause M.8 and indicates the corresponding specified instance of Class_of_substance.

M.8.1 Specified instances of Class_of_substance for phase

Specified instances of Class_of_substance relevant to state of matter, or Phase (see 4.2.123), are defined in table M.35.

Table M.35 – Specified instances of Class_of_substance for phase

inst.	name	definition
1283	**Liquid**	A Material that a liquid.
NOTE – A Liquid is above or close to its melting point and below or at is boiling point.		
1284	**Liquid_solid**	A Mixture (see annex M, instance 1402) that that consists of parts that are in Liquid (see annex M, instance 1283) and Solid (see annex M, instance 1286) states, such as a slurry.
1285	**Monophase**	A Material that is above its critical pressure and critical temperature.
1286	**Solid**	A Material that is solid.
NOTE – A Solid is below or at its melting point.		
1287	**Vapour**	A Material that is above or at its boiling point.
1288	**Vapour_liquid**	A Mixture (see annex M, instance 1402) that that consists of parts that are in Vapour (see annex M, instance 1287) and Liquid (see annex M, instance 1283) states.
1289	**Vapour_liquid_solid**	A Mixture (see annex M, instance 1402) that that consists of parts that are in Vapour (see annex M, instance 1287), Liquid (see annex M, instance 1283) and Solid (see annex M, instance 1286) states.
1290	**Vapour_solid**	A Mixture (see annex M, instance 1402) that that consists of parts that are in Vapour (see annex M, instance 1287) and Solid (see annex M, instance 1286) states.

M.8.2 Specified instances of Class_of_substance for process material

Specified instances of Class_of_substance relevant to Process_material (see 4.2.136) are defined in table M.36.

Table M.36 – Specified instances of Class_of_substance for process material

inst.	name	definition
1291	**Acid**	A Substance (see annex M, instance 1473) that has a PH-value less than 7.
1292	**Additive**	A Substance (see annex M, instance 1473) that is an 'additive' as defined in ISO 1998.
1293	**Air**	A Mixture (see annex M, instance 1402) and a Gas (see annex M, instance 1359) that consists of oxygen, nitrogen and small quantities of other Gasses in with the concentrations present in the Earth's atmosphere.
1294	**Alkylate**	A Hydrocarbon (see annex M, instance 1370) that is a 'alkylate' as defined in ISO 1998.
1295	**Anti_knock_agent**	An Additive (see annex M, instance 1292) that is a 'anti-knock agent' as defined in ISO 1998.
1296	**Antifluorescence_agent**	An Additive (see annex M, instance 1292) that is an 'anti-fluorescence agent' as defined in ISO 1998.
1297	**Asphalt**	A Mixture (see annex M, instance 1402) that is an 'asphalt' as defined in ISO 1998.
1298	**Asphaltene**	A Hydrocarbon (see annex M, instance 1370) that is an 'asphaltene' as defined in ISO 1998.
1299	**Asphaltic_crude_oil**	A Crude_oil (see annex M, instance 1331) that is an 'asphaltic crude oil' as defined in ISO 1998.
1300	**Asphaltic_sand**	A Sand (see annex M, instance 1452) that that an 'asphaltic sand' as defined in ISO 1998.
1301	**Associated_gas**	A Gas (see annex M, instance 1359) that is a by-product of the production of liquid Hydrocarbon (see annex M, instance 1370).
1302	**Atmospheric_distillate**	A Petroleum_distillate (see annex M, instance 1430) that is an 'atmospheric distillate' as defined in ISO 1998.

Table M.36 – Specified instances of Class_of_substance for process material (continued)

inst.	name	definition
1303	**Aviation_gasoline**	A Gasoline (see annex M, instance 1361) that is an 'aviation gasoline' as defined in ISO 1998.
1304	**Base_oil**	A Oil (see annex M, instance 1420) that is a 'base oil' as defined in ISO 1998.
1305	**Batch**	A Substance (see annex M, instance 1473) that has a common processing history.
1306	**Benzole_wash_oil**	An Oil (see annex M, instance 1420) that is a 'benzole wash oil' as defined in ISO 1998.
1307	**Binder**	A Substance (see annex M, instance 1473) that is a 'binder' as defined in ISO 1998.
1308	**Bitumen**	A Hydrocarbon (see annex M, instance 1370) that is a 'bitumen' as defined in ISO 1998.
1309	**Bituminous_binder**	A Binder (see annex M, instance 1307) that is a 'bituminous binder' as defined in ISO 1998.
1310	**Black_oil**	A Lubricating_oil (see annex M, instance 1393) that is a 'black oil' as defined in ISO 1998.
1311	**Black_product**	A Petroleum_distillate (see annex M, instance 1430) that is a 'black product' as defined in ISO 1998.
1312	**Blown_bitumen**	A Bitumen (see annex M, instance 1308) that is an 'blown bitumen' as defined in ISO 1998.
1313	**Blown_oil**	A Oil (see annex M, instance 1420) that is a 'blown oil' as defined in ISO 1998.
1314	**Bottled_gas**	A Liquefied_petroleum_gas (see annex M, instance 1390) that is an 'bottled gas' as defined in ISO 1998.
1315	**Bottom_fraction**	A Fraction (see annex M, instance 1356) that is a 'bottoms' as defined in ISO 1998.
1316	**Bright_stock**	A Base_oil (see annex M, instance 1304) that is an 'bright stock' as defined in ISO 1998.

Table M.36 – Specified instances of Class_of_substance for process material (continued)

inst.	name	definition
1317	**Butane**	A Hydrocarbon (see annex M, instance 1370) that that consists mostly of C4H10 molecules.
1318	**C7_plus_fraction**	A Fraction (see annex M, instance 1356) that that consists mostly of heptane and heavier molecules
1319	**Cable_compound**	An Oil (see annex M, instance 1420) that is a 'cable compound' as defined in ISO 1998.
1320	**Carbon**	A Substance (see annex M, instance 1473) that consists mostly of carbon atoms.
1321	**Carbon_black**	A Carbon (see annex M, instance 1320) that is a 'carbon black' as defined in ISO 1998.
1322	**Carbon_dioxide**	An Inorganic_chemical (see annex M, instance 1378) that consists mostly of CO2 molecules.
1323	**Catalyst**	A Substance (see annex M, instance 1473) that stimulates a chemical reaction
1324	**Ceresin**	A Wax (see annex M, instance 1489) that is a 'ceresin' as defined in ISO 1998.
1325	**Cleaning_fluid**	A Fluid (see annex M, instance 1353) that is used for cleaning.
1326	**Coal**	A Substance (see annex M, instance 1473) that that consists mostly of carbon in a form found in nature.
1327	**Commercial_butane**	A Butane (see annex M, instance 1317) that is a 'commercial butane' as defined in ISO 1998.
1328	**Commercial_propane**	A Propane (see annex M, instance 1442) that is a 'commercial propane' as defined in ISO 1998.
1329	**Construction_material**	A Solid (see annex M, instance 1286) that is used for construction of Material plant items.

Table M.36 – Specified instances of Class_of_substance for process material (continued)

inst.	name	definition
1330	**Contaminated_soil**	A Soil (see annex M, instance 1459) that is polluted.
1331	**Crude_oil**	A Mineral_oil (see annex M, instance 1400) that is a 'crude oil' as defined in ISO 1998.
1332	**Cut_back_bitumen**	A Bitumen (see annex M, instance 1308) that is a 'cut-back bitumen' as defined in ISO 1998.
1333	**Cutting_oil**	A Lubricating_oil (see annex M, instance 1393) that is a 'cutting oil' as defined in ISO 1998.
1334	**Cylinder_oil**	A Lubricating_oil (see annex M, instance 1393) that is a 'cylinder oil' as defined in ISO 1998.
1335	**Cylinder_stock_oil**	A Base_oil (see annex M, instance 1304) that is a 'cylinder stock' as defined in ISO 1998.
1336	**Damping_fluid**	A Fluid (see annex M, instance 1353) that is a 'damping fluid' as defined in ISO 1998.
1337	**Decane**	A Hydrocarbon (see annex M, instance 1370) that consists mostly of C10H22 molecules.
1338	**Detergent_oil**	A Lubricating_oil (see annex M, instance 1393) that is an 'detergent oil' as defined in ISO 1998.
1339	**Distillation_component**	A Substance (see annex M, instance 1473) that that has a narrow boiling temperature range or boiling point.
1340	**Domestic_waste**	A Waste (see annex M, instance 1487) that is generated by human habitation.
1341	**Electrical_insulation_-liquid**	A Liquid (see annex M, instance 1283) that isolates electrical components.

Table M.36 – Specified instances of Class_of_substance for process material (continued)

inst.	name	definition
1342	**Emission**	A Waste (see annex M, instance 1487) that is emitted to the atmosphere.
1343	**Emulsified_bitumen**	A Bitumen (see annex M, instance 1308) that is an 'emulsified bitumen' as defined in ISO 1998.
1344	**Emulsion**	A Substance (see annex M, instance 1473) that consists of immiscible fluids where one is dispersed in another.
1345	**Engine_oil**	A Lubricating_oil (see annex M, instance 1393) that is an 'engine oil' as defined in ISO 1998.
1346	**Ethane**	A Hydrocarbon (see annex M, instance 1370) that that consists mostly of C2H6 molecules.
1347	**Exhaust_gas**	A Waste (see annex M, instance 1487) that is the result of combustion.
1348	**Extract**	A Substance (see annex M, instance 1473) that that is an 'extract' as defined in ISO 1998.
1349	**Filler**	An Inert_material (see annex M, instance 1376) that is a 'filler' as defined in ISO 1998.
1350	**Filter_cake**	A Substance (see annex M, instance 1473) that is a 'filter cake' as defined in ISO 1998.
1351	**Flared_gas**	A Gas (see annex M, instance 1359) that is burned in a flare.
1352	**Flue_gas**	A Gas (see annex M, instance 1359) that is emitted through a stack or chimney.
1353	**Fluid**	A Substance (see annex M, instance 1473) that that is capable of flow.
NOTE – A Fluid may be Liquid (see annex M, instance 1283), Vapour (see annex M, instance 1287) or a fluidised Solid (see annex M, instance 1286).		

Table M.36 – Specified instances of Class_of_substance for process material (continued)

inst.	name	definition
1354	**Flux_oil**	A Oil (see annex M, instance 1420) that is a 'flux oil' as defined in ISO 1998.
1355	**Fluxed_bitumen**	A Bitumen (see annex M, instance 1308) that is a 'fluxed bitumen' as defined in ISO 1998.
1356	**Fraction**	A Mixture (see annex M, instance 1402) that is a 'fraction' as defined in ISO 1998.
1357	**Fuel**	A Substance (see annex M, instance 1473) that is used for heat generation by burning.
1358	**Fuel_oil**	A Fuel (see annex M, instance 1357) and an Oil (see annex M, instance 1420) that is a 'fuel oil' as defined in ISO 1998.
1359	**Gas**	A Vapour (see annex M, instance 1287) that is in vapour phase under atmospheric conditions.
1360	**Gasoil**	A Petroleum_distillate (see annex M, instance 1430) that is a 'gasoil' as defined in ISO 1998.
1361	**Gasoline**	A Petroleum_distillate (see annex M, instance 1430) that is a 'gasoline' as defined in ISO 1998.
1362	**Gelling_agent**	An Additive (see annex M, instance 1292) that is a 'gelling agent' as defined in ISO 1998.
1363	**Grease**	A Lubricant (see annex M, instance 1392) that is a 'grease' as defined in ISO 1998.
1364	**Heavy_distillate**	A Petroleum_distillate (see annex M, instance 1430) that is a 'heavy distillate' as defined in ISO 1998.
1365	**Heptane**	A Hydrocarbon (see annex M, instance 1370) that that consists mostly of C7H16 molecules.
1366	**Heterogeneous_mixture**	A Mixture (see annex M, instance 1402) that has a composition that varies from point to point.

Table M.36 – Specified instances of Class_of_substance for process material (continued)

inst.	name	definition
1367	**Hexane**	A Hydrocarbon (see annex M, instance 1370) that consists mostly of C6H14 molecules.
1368	**Homogeneous_mixture**	A Mixture (see annex M, instance 1402) that has a composition that is the same at each point.
1369	**Hot_oil**	An Oil (see annex M, instance 1420) that is used for heating.
1370	**Hydrocarbon**	A Substance (see annex M, instance 1473) that consists mostly of molecules that are composed of hydrogen and carbon atoms.
1371	**Hydrocarbon_condensate**	A Hydrocarbon (see annex M, instance 1370) that is a 'condensate' as defined in ISO 1998.
1372	**Hydrogen**	A Inorganic_chemical (see annex M, instance 1378) that consists mostly of H2 molecules.
1373	**Hydrogen_sulphide**	A Inorganic_chemical (see annex M, instance 1378) that consists mostly of H2S molecules.
1374	**Ice**	A Water (see annex M, instance 1488) and a Solid (see annex M, instance 1286).
1375	**Industrial_component_fraction**	A Distillation_component (see annex M, instance 1339) that consists of a narrow fraction around one or a few types of molecule.
1376	**Inert_material**	A Substance (see annex M, instance 1473) that is an 'inert material' as defined in ISO 1998.
1377	**Inhibitor**	An Additive (see annex M, instance 1292) that is an 'inhibitor' as defined in ISO 1998.
1378	**Inorganic_chemical**	A Substance (see annex M, instance 1473) that consists of inorganic molecules.
1379	**Instrument_air**	An Air (see annex M, instance 1293) that is dried and purified for use by Instruments (see annex M, instance 140).

Table M.36 – Specified instances of Class_of_substance for process material (continued)

inst.	name	definition
1380	**Insulating_oil**	A Lubricating_oil (see annex M, instance 1393) that is an 'insulating oil' as defined in ISO 1998.
1381	**Iso-butane**	A Butane (see annex M, instance 1317) that has carbon atoms in a molecule arranged in a branched chain.
1382	**Iso-pentane**	A Pentane (see annex M, instance 1428) that has carbon atoms in a molecule are arranged in a branched chain.
1383	**Jet_fuel**	A Fuel (see annex M, instance 1357) that is a 'jet fuel' as defined in ISO 1998.
1384	**Kerosene**	An Atmospheric_distillate (see annex M, instance 1302) that is an 'kerosene' as defined in ISO 1998.
1385	**Lamp_oil**	A Kerosene (see annex M, instance 1384) that is a 'lamp oil' as defined in ISO 1998.
1386	**Light_distillate**	A Petroleum_distillate (see annex M, instance 1430) that is a 'light distillate' as defined in ISO 1998.
1387	**Liquid_paraffin**	A Oil (see annex M, instance 1420) that is an 'liquid paraffin' as defined in ISO 1998.
1388	**Liquid_waste**	A Waste (see annex M, instance 1487) and a Liquid (see annex M, instance 1283).
1389	**Liquefied_natural_gas**	A Natural_gas (see annex M, instance 1407) and a Liquid (see annex M, instance 1283).
1390	**Liquefied_petroleum_gas**	A Hydrocarbon (see annex M, instance 1370) and a Liquid (see annex M, instance 1283) that is an 'liquefied petroleum gas' as defined in ISO 1998.
1391	**Long_residue**	A Hydrocarbon (see annex M, instance 1370) that that is the heavy oil remaining after a first crude distillation.
1392	**Lubricant**	A Substance (see annex M, instance 1473) that is a 'lubricant' as defined in ISO 1998.

Table M.36 – Specified instances of Class_of_substance for process material (continued)

inst.	name	definition
1393	**Lubricating_oil**	A Lubricant (see annex M, instance 1392) and an Oil (see annex M, instance 1420) that is a 'lubricating oil' as defined in ISO 1998.
1394	**Lubricating_oil_component**	A Substance (see annex M, instance 1473) that is used as a basis for fabrication of Lubricating_oil (see annex M, instance 1393).
1395	**Lubricating_oil_distillate**	A Petroleum_distillate (see annex M, instance 1430) that is an 'lubricating oil distillate' as defined in ISO 1998.
1396	**Machine_oil**	A Lubricating_oil (see annex M, instance 1393) that is a 'machine oil' as defined in ISO 1998.
1397	**Methane**	A Hydrocarbon (see annex M, instance 1370) that that consists mostly of CH4 molecules.
1398	**Micro_crystalline_wax**	A Wax (see annex M, instance 1489) that is a 'micro-crystalline wax' as defined in ISO 1998.
1399	**Middle_distillate**	A Petroleum_distillate (see annex M, instance 1430) that is a 'middle distillate' as defined in ISO 1998.
1400	**Mineral_oil**	An Oil (see annex M, instance 1420) that is a 'mineral oil' as defined in ISO 1998.
1401	**Mineral_wax**	A Wax (see annex M, instance 1489) that is a 'mineral wax' as defined in ISO 1998.
1402	**Mixture**	A Substance (see annex M, instance 1473) that that consists of more than one class of molecule.
1403	**Motor_gasoline**	A Gasoline (see annex M, instance 1361) that is a 'motor gasoline' as defined in ISO 1998.
1404	**Naphtha**	A Petroleum_distillate (see annex M, instance 1430) that is an 'naphtha' as defined in ISO 1998.
1405	**Naphthenic_crude_oil**	A Crude_oil (see annex M, instance 1331) that is an 'napthenic crude oil' as defined in ISO 1998.

Table M.36 – Specified instances of Class_of_substance for process material (continued)

inst.	name	definition
1406	**Narrow_fraction**	A Fraction (see annex M, instance 1356) that has a narrow boiling range.
1407	**Natural_gas**	A Gas (see annex M, instance 1359) and a Fuel (see annex M, instance 1357) that is a hydrocarbon gas produced from a subsurface reservoir and that is a 'natural gas' as defined in ISO 1998.
1408	**Natural_gas_liquid**	A Hydrocarbon (see annex M, instance 1370) and a Liquid (see annex M, instance 1283) that is co-produced with Natural_gas (see annex M, instance 1407).
1409	**Natural_gasoline**	A Gasoline (see annex M, instance 1361) that is a 'natural gasoline' as defined in ISO 1998.
1410	**Newtonian_fluid**	A Fluid (see annex M, instance 1353) that is a 'Newtonian fluid' as defined in ISO 1998.
1411	**Nitrogen**	An Inorganic_chemical (see annex M, instance 1378) that consists mostly of N2 molecules.
1412	**Nitrogen_dioxide**	A Nitrogen_oxide (see annex M, instance 1413) that consists mostly of NO2 molecules.
1413	**Nitrogen_oxide**	An Inorganic_chemical (see annex M, instance 1378) that consists mostly of NO2 molecules or NO3 molecules or both.
1414	**Nitrogen_trioxide**	A Nitrogen_oxide (see annex M, instance 1413) that consists mostly of NO3 molecules.
1415	**Non_newtonian_fluid**	A Fluid (see annex M, instance 1353) that is a 'non-Newtonian fluid' as defined in ISO 1998.
1416	**Nonane**	A Hydrocarbon (see annex M, instance 1370) that that consists mostly of C9H20 molecules.
1417	**Normal_butane**	A Butane (see annex M, instance 1317) that has carbon atoms in a molecule arranged in a straight line.
1418	**Normal_pentane**	A Pentane (see annex M, instance 1428) that has carbon atoms in a molecule are arranged in a straight line.

Table M.36 – Specified instances of Class_of_substance for process material (continued)

inst.	name	definition
1419	**Octane**	A Hydrocarbon (see annex M, instance 1370) that that consists mostly of C8H18 molecules.
1420	**Oil**	A Hydrocarbon (see annex M, instance 1370) and a Liquid (see annex M, instance 1283).
1421	**Oil_spill**	A Waste (see annex M, instance 1487) that consists mostly of oil that has been spilled.
1422	**Oxygen**	An Inorganic_chemical (see annex M, instance 1378) that that consists mostly of O2 molecules.
1423	**Ozokerite**	A Mineral_wax (see annex M, instance 1401) that is an 'ozokerite' as defined in ISO 1998.
1424	**Paint**	A Substance (see annex M, instance 1473) that intended to cover a surface as a thin layer.
NOTE – Paint may be used for corrosion protection.		
1425	**Paraffin_scale**	A Wax (see annex M, instance 1489) that is a 'paraffin scale' as defined in ISO 1998.
1426	**Paraffin_wax**	A Wax (see annex M, instance 1489) that is a 'paraffin wax' as defined in ISO 1998.
1427	**Paraffinic_crude_oil**	A Crude_oil (see annex M, instance 1331) that is a 'paraffinic crude oil' as defined in ISO 1998.
1428	**Pentane**	A Hydrocarbon (see annex M, instance 1370) that consists mostly of C5H12 molecules.
1429	**Petrochemical_feedstock**	A Substance (see annex M, instance 1473) that is a 'feedstock' as defined in ISO 1998.
1430	**Petroleum_distillate**	A Fraction (see annex M, instance 1356) that is a 'distillate' as defined in ISO 1998.
1431	**Petroleum_flux**	A Substance (see annex M, instance 1473) that is an 'flux' as defined in ISO 1998.
1432	**Petrolatum**	A Wax (see annex M, instance 1489) that is a 'petrolatum' as defined in ISO 1998.

Table M.36 – Specified instances of Class_of_substance for process material (continued)

inst.	name	definition
1433	**Petroleum_coke**	A Carbon (see annex M, instance 1320) that is a 'petroleum coke' as defined in ISO 1998.
1434	**Petroleum_ether**	A Special_boiling_point_spirit (see annex M, instance 1465) that is a 'petroleum ether' as defined in ISO 1998.
1435	**Platformate**	A Hydrocarbon (see annex M, instance 1370) that has properties received by treatment in a platforming process.
1436	**Pool**	A Substance (see annex M, instance 1473) that that is a collection of batches.
NOTE – A Property (see 4.2.137) of a Pool assigned by a Possession_of_property_by_each_member_of_collection (see 4.2.133) applies to each batch.		
1437	**Pour_point_depressant**	An Additive (see annex M, instance 1292) that is an 'pour oil depressant' as defined in ISO 1998.
1438	**Preservative_oil**	A Oil (see annex M, instance 1420) that is a 'preservative' as defined in ISO 1998.
1439	**Pressure_distillate**	A Unrefined_distillate (see annex M, instance 1482) that is a 'pressure distillate' as defined in ISO 1998.
1440	**Process_material**	A Substance (see annex M, instance 1473) that is subject to, or the result of, a process Activity (see 4.2.7).
1441	**Produced_well_water**	A Water (see annex M, instance 1488) that is produced from a Well (see annex M, instance 363).
NOTE – Produced_well_water is usually a by-product of oil or gas production.		
1442	**Propane**	A Hydrocarbon (see annex M, instance 1370) that consists mostly of C3H8 molecules.
1443	**Pseudo_component**	A Distillation_component (see annex M, instance 1339) that is a narrow Fraction (see annex M, instance 1356) treated as a Pure_component (see annex M, instance 1444).

Table M.36 – Specified instances of Class_of_substance for process material (continued)

inst.	name	definition
1444	**Pure_component**	A Distillation_component (see annex M, instance 1339) that consists of only one class of molecule.
1445	**Purge_air**	An Air (see annex M, instance 1293) that is intended to make an item free of unwanted gas.
1446	**Reduced_crude**	A Crude_oil (see annex M, instance 1331) that is a 'reduced crude' as defined in ISO 1998.
1447	**Refinery_fuel**	A Hydrocarbon (see annex M, instance 1370) that suitable as Fuel (see annex M, instance 1357) at a refinery.
1448	**Refinery_gas**	A Hydrocarbon (see annex M, instance 1370) that is a 'refinery gas' as defined in ISO 1998.
1449	**Residual_fuel**	A Fuel (see annex M, instance 1357) that is a heavy Fuel resulting as by-product from a refining process.
1450	**Rock**	A Silicon_oxide (see annex M, instance 1456) that is a 'rock' as defined in ISO 1998.
1451	**Rock_asphalt**	A Rock (see annex M, instance 1450) that is a 'rock asphalt' as defined in ISO 1998.
1452	**Sand**	A Silicon_oxide (see annex M, instance 1456) that is a 'sand' as defined in ISO 1998.
1453	**Saturated_steam**	A Steam (see annex M, instance 1468) that is on the liquid/vapour phase boundary.
1454	**Shale_oil**	A Mineral_oil (see annex M, instance 1400) that is a 'shale oil' as defined in ISO 1998.
1455	**Short_residue**	A Hydrocarbon (see annex M, instance 1370) that is the very heavy oil remaining after vacuum distillation.
1456	**Silicon_oxide**	A Inorganic_chemical (see annex M, instance 1378) that consists mostly of SiO2 molecules.

Table M.36 – Specified instances of Class_of_substance for process material (continued)

inst.	name	definition
1457	**Slack_wax**	A Wax (see annex M, instance 1489) that is a 'slack wax' as defined in ISO 1998.
1458	**Sludge**	A Substance (see annex M, instance 1473) that that is a 'sludge' as defined in ISO 1998.
1459	**Soil**	A Substance (see annex M, instance 1473) that is the top layer at the surface of the Earth and that is mostly SiO2, often in the form of clay, sand and stones.
1460	**Solid_waste**	A Waste (see annex M, instance 1487) and a Solid (see annex M, instance 1286).
1461	**Soluble_oil**	A Oil (see annex M, instance 1420) that is a 'soluble oil' as defined in ISO 1998.
1462	**Solvent**	A Substance (see annex M, instance 1473) that is intended to bring or keep other substance in a liquid phase by solution.
1463	**Solvent_component**	A Substance (see annex M, instance 1473) that is intended to be used as a basis for solvent fabrication.
1464	**Sour_crude**	A Crude_oil (see annex M, instance 1331) that is a 'sour crude' as defined in ISO 1998.
1465	**Special_boiling_point_-spirit**	A Petroleum_distillate (see annex M, instance 1430) that is an 'special boiling point spirit' as defined in ISO 1998.
1466	**Spindle_oil**	A Lubricating_oil (see annex M, instance 1393) that is a 'spindle oil' as defined in ISO 1998.
1467	**Standard_refinery_fuel**	A Fuel (see annex M, instance 1357) that has a reference calorific value.
1468	**Steam**	A Water (see annex M, instance 1488) and a Vapour (see annex M, instance 1287) that is above its boiling point and below its critical point.
1469	**Steam_turbine_oil**	A Lubricating_oil (see annex M, instance 1393) that is a 'steam turbine oil' as defined in ISO 1998.

Table M.36 – Specified instances of Class_of_substance for process material (continued)

inst.	name	definition
1470	**Straight_run_gasoline**	A Gasoline (see annex M, instance 1361) that is a 'straight run gasoline' as defined in ISO 1998.
1471	**Straight_run_product**	A Petroleum_distillate (see annex M, instance 1430) that is a 'straight run product' as defined in ISO 1998.
1472	**Stream**	A Substance (see annex M, instance 1473) that is flowing.
1473	**Substance**	A Material that is regarded as a defined set of molecules.
NOTE – The classification of a Material as a Substance, or as a specialisation of Substance, is information about the nature of the Material at a molecular scale. The classification is not information about the shape of the Material.		
1474	**Sulphur**	A Inorganic_chemical (see annex M, instance 1378) that consists mostly of S2 and larger molecules of sulphur atoms.
1475	**Sulphur_dioxide**	A Inorganic_chemical (see annex M, instance 1378) that consists mostly of SO2 molecules.
1476	**Superheated_steam**	A Steam (see annex M, instance 1468) that is above the liquid/vapour phase boundary.
1477	**Sweet_crude**	A Crude_oil (see annex M, instance 1331) that is a 'sweet crude' as defined in ISO 1998.
1478	**Sweet_gasoline**	A Gasoline (see annex M, instance 1361) that is a 'sweet gasoline' as defined in ISO 1998.
1479	**Textile_oil**	A Mineral_oil (see annex M, instance 1400) that is a 'textile oil' as defined in ISO 1998.
1480	**Thickener**	A Additive (see annex M, instance 1292) that is a 'thickener' as defined in ISO 1998.
1481	**Top_fraction**	A Fraction (see annex M, instance 1356) that is a 'tops' as defined in ISO 1998.

Table M.36 – Specified instances of Class_of_substance for process material (concluded)

inst.	name	definition
1482	**Unrefined_distillate**	A Petroleum_distillate (see annex M, instance 1430) that is an 'unrefined distillate' as defined in ISO 1998.
1483	**Used_lubricant**	A Used_oil (see annex M, instance 1484) that has been used for lubrication.
1484	**Used_oil**	An Oil (see annex M, instance 1420) that is a 'used oil' as defined in ISO 1998.
1485	**Utility_substance**	A Substance (see annex M, instance 1473) that supports the processing of a main product.
1486	**Vacuum_distillate**	A Petroleum_distillate (see annex M, instance 1430) that is a 'vacuum distillate' as defined in ISO 1998.
1487	**Waste**	A Substance (see annex M, instance 1473) that is not useful without reprocessing.
1488	**Water**	A Inorganic_chemical (see annex M, instance 1378) that consists mostly of H2O molecules.
1489	**Wax**	A Hydrocarbon (see annex M, instance 1370) that is a 'wax' as defined in ISO 1998.
1490	**Waxy_distillate**	A Petroleum_distillate (see annex M, instance 1430) that is a 'waxy distillate' as defined in ISO 1998.
1491	**White_oil**	A Lubricating_oil (see annex M, instance 1393) that is a 'white oil' as defined in ISO 1998.
1492	**White_product**	A Petroleum_distillate (see annex M, instance 1430) that is a 'white product' as defined in ISO 1998.
1493	**White_spirit**	A Solvent (see annex M, instance 1462) that is a 'white spirit' as defined in ISO 1998.
1494	**Wide_fraction**	A Fraction (see annex M, instance 1356) that has a wide boiling range.

M.9 Specified enumerated Properties

A specified enumerated instance of Property (see 4.2.137) is an instance that is specified by this part of ISO 10303. The meaning of a specified instance of Property shall not be clarified or redefined by a description using Text (see 4.2.171) or a Numeric_value (see 4.2.112).

M.9.1 Specified enumerated instances of Property that are Colours

The specified instances of Property that are Colours (see annex M, instance 1280) are defined in table M.37.

Table M.37 – Specified enumerated instances of Property that are Colours

inst.	name	definition
1495	**Black**	The Colour that is black.
1496	**Blue**	The Colour that is blue.
1497	**Cyan**	The Colour that is cyan.
1498	**Green**	The Colour that is green.
1499	**Magenta**	The Colour that is magenta.
1500	**Red**	The Colour that is red.
1501	**White**	The Colour that is white.
1502	**Yellow**	The Colour that is yellow.

M.10 Specified instances of Recognized_involvement_for_activity_according_to_class

The specified instances of Recognized_involvement_for_activity_according_to_class (see 4.2.151) are defined below.

The column headings of the table are the attributes of Recognized_involvement_for_activity_according_to_class. The contents of the table are specified instances of Class_of_activity (see M.1) and specified instances of Class_of_involvement (see M.5).

NOTE – Each instance of the AIM entity **standard_involvement_in_activity_class_constraint** (see 5.2.3.163) has attributes **relating_group** and **related_group** inherited from **group_relationship**.

The **relating_group** is a **standard_class_of_activity** that has a **name** attribute inherited from **group**. The **related_group** is a **standard_class_of_involvement** that has a **name** attribute inherited from **group**. The **name** attribute of the **standard_class_of_activity** and the **name** attribute of the **standard_class_of_involvement** form a keyword pair.

The keyword pair is one of those listed in the tables in clause M.10 and indicates the corresponding specified instance of Recognized_involvement_for_activity_according_to_class.

M.10.1 Specified instances of Recognized_involvement_for_activity_according_to_class for Design

The specified instances of Recognized_involvement_for_activity_according_to_class for Design (see annex M, instance 2) are defined in table M.38.

Table M.38 – Specified instances of Recognized_involvement_for_activity_according_to_class for design

inst.	activity	involvement
1503	Assess (see annex M, instance 1)	Assessed_object (see annex M, instance 530)
1504	Assess (see annex M, instance 1)	Assessment_purpose (see annex M, instance 531)
1505	Assess (see annex M, instance 1)	Assessment_result (see annex M, instance 532)
1506	Assess (see annex M, instance 1)	Performer (see annex M, instance 537)
1507	Design (see annex M, instance 2)	Performer (see annex M, instance 537)
1508	Design (see annex M, instance 2)	Referenced_in_design (see annex M, instance 538)
1509	Design (see annex M, instance 2)	Result_of_design (see annex M, instance 539)

M.10.2 Specified instances of Recognized_involvement_for_activity_according_to_class for processes

The specified instances of Recognized_involvement_for_activity_according_to_class for processes are defined in table M.39.

Table M.39 – Specified instances of Recognized_involvement_for_activity_according_to_class for processes

inst.	activity	involvement
1510	Transfer_material (see annex M, instance 3)	Material_destination (see annex M, instance 534)
1511	Transfer_material (see annex M, instance 3)	Material_source (see annex M, instance 535)
1512	Transfer_material (see annex M, instance 3)	Performer (see annex M, instance 537)
1513	Transfer_material (see annex M, instance 3)	Transferred_material (see annex M, instance 540)
1514	Transform_material (see annex M, instance 4)	Input_material (see annex M, instance 533)
1515	Transform_material (see annex M, instance 4)	Output_material (see annex M, instance 536)
1516	Transform_material (see annex M, instance 4)	Performer (see annex M, instance 537)

M.11 Specified instances of Classification_of_class_of_facility

The specified instances of Classification_of_class_of_facility (see 4.2.36) are defined in table M.40.

NOTE – Each instance of the AIM entity **standard_classification_of_class_of_facility** (see 5.2.3.161) has attributes **relating_group** and **related_group** inherited from **group_relationship**.

The **relating_group** and the **related_group** are both instances of **standard_class_of_facility**, and are such that the **relating_group** is the classifier and the **related_group** is the classified. The **name** attributes of the two instances of **standard_class_of_facility** form a keyword pair.

The keyword pair is one of those listed in the table in clause M.11 and indicates the corresponding specified instance of Classification_of_class_of_facility.

Table M.40 – Specified instances of Classification_of_class_of_facility

inst.	classifier (broader class)	classified (narrower class)
1517	Air_cooler (see instance 39)	Cooling_tower (see instance 46)
1518	Air_supply_system (see instance 72)	Instrument_air_supply_system (see instance 142)
1519	Alarm_system (see instance 74)	Gas_alarm_system (see instance 125)
1520	Analyser (see instance 76)	Boiling_point_analyser (see instance 81)
1521	Analyser (see instance 76)	Carbon_dioxide_analyser (see instance 82)
1522	Analyser (see instance 76)	Cloud_point_analyser (see instance 83)
1523	Analyser (see instance 76)	Density_analyser (see instance 92)
1524	Analyser (see instance 76)	Dew_point_analyser (see instance 94)
1525	Analyser (see instance 76)	Flash_point_analyser (see instance 117)
1526	Analyser (see instance 76)	Flue_gas_analyser (see instance 124)
1527	Analyser (see instance 76)	H2S_SO2_ratio_analyser (see instance 129)
1528	Analyser (see instance 76)	H2S_analyser (see instance 130)
1529	Analyser (see instance 76)	Hardness_analyser (see instance 132)

Table M.40 – Specified instances of Classification_of_class_of_facility (continued)

inst.	classifier (broader class)	classified (narrower class)
1530	Analyser (see instance 76)	Hydrocarbons_in_H2S_analyser (see instance 135)
1531	Analyser (see instance 76)	Hydrocarbons_in_water_analyser (see instance 136)
1532	Analyser (see instance 76)	N2_analyser (see instance 170)
1533	Analyser (see instance 76)	NOx_analyser (see instance 171)
1534	Analyser (see instance 76)	Octane_number_analyser (see instance 174)
1535	Analyser (see instance 76)	Oxygen_analyser (see instance 179)
1536	Analyser (see instance 76)	Pour_point_analyser (see instance 187)
1537	Analyser (see instance 76)	Refractive_index_analyser (see instance 200)
1538	Analyser (see instance 76)	Sulphur_analyser (see instance 217)
1539	Analyser (see instance 76)	Thermal_conductivity_analyser (see instance 231)
1540	Analyser (see instance 76)	Vapour_pressure_analyser (see instance 234)
1541	Analyser (see instance 76)	Viscosity_analyser (see instance 238)
1542	Analyser (see instance 76)	Water_content_analyser (see instance 240)
1543	Analyser (see instance 76)	Wobbe_index_analyser (see instance 242)
1544	Automatic_detector (see instance 78)	Fire_detector (see instance 114)
1545	Automatic_detector (see instance 78)	Fire_or_gas_detector (see instance 115)
1546	Automatic_detector (see instance 78)	Flame_detector (see instance 116)
1547	Automatic_detector (see instance 78)	Flow_detector (see instance 119)
1548	Automatic_detector (see instance 78)	Gas_detector (see instance 127)
1549	Automatic_detector (see instance 78)	HF_in_air_detector (see instance 133)
1550	Automatic_detector (see instance 78)	Hydrocarbons_in_water_detector (see instance 137)
1551	Automatic_detector (see instance 78)	Mist_detector (see instance 166)
1552	Automatic_detector (see instance 78)	Moisture_detector (see instance 167)

Table M.40 – Specified instances of Classification_of_class_of_facility (continued)

inst.	classifier (broader class)	classified (narrower class)
1553	Automatic_detector (see instance 78)	Position_detector (see instance 185)
1554	Automatic_detector (see instance 78)	Smoke_detector (see instance 213)
1555	Automatic_switch (see instance 79)	Differential_pressure_switch (see instance 97)
1556	Automatic_switch (see instance 79)	Differential_temperature_switch (see instance 100)
1557	Automatic_switch (see instance 79)	Level_switch (see instance 152)
1558	Automatic_switch (see instance 79)	Limit_switch (see instance 154)
1559	Automatic_switch (see instance 79)	Pressure_switch (see instance 193)
1560	Automatic_switch (see instance 79)	Temperature_switch (see instance 229)
1561	Auxiliary_system (see instance 283)	Fuel_system (see instance 400)
1562	Auxiliary_system (see instance 283)	Lubrication_system (see instance 408)
1563	Auxiliary_system (see instance 283)	Oil_system (see instance 414)
1564	Auxiliary_system (see instance 283)	Purge_air_system (see instance 422)
1565	Auxiliary_system (see instance 283)	Seal_flush_system (see instance 426)
1566	Auxiliary_system (see instance 283)	Seal_gas_system (see instance 424)
1567	Auxiliary_system (see instance 283)	Seal_oil_system (see instance 425)
1568	Auxiliary_system (see instance 283)	Starting_system (see instance 429)
1569	Boiler (see instance 42)	Steam_generator (see instance 65)
1570	Boiler (see instance 42)	Waste_heat_boiler (see instance 69)
1571	Boiling_point_analyser (see instance 81)	Final_boiling_point_analyser (see instance 112)
1572	Centrifuge (see instance 375)	Decanting_centrifuge (see instance 386)
1573	Centrifuge (see instance 375)	Filtering_centrifuge (see instance 397)
1574	Centrifuge (see instance 375)	Oil_conditioner (see instance 411)
1575	Check_valve (see instance 445)	Excess_flow_check_valve (see instance 449)
1576	Check_valve (see instance 445)	Foot_valve (see instance 450)
1577	Check_valve (see instance 445)	Stop_check_valve (see instance 464)

Table M.40 – Specified instances of Classification_of_class_of_facility (continued)

inst.	classifier (broader class)	classified (narrower class)
1578	Communication_system (see instance 286)	Telecommunications_system (see instance 355)
1579	Condenser (see instance 44)	Freeze_condenser (see instance 54)
1580	Condenser (see instance 44)	Sulphur_condenser (see instance 66)
1581	Connector_of_facility (see instance 18)	Electrical_port (see instance 22)
1582	Connector_of_facility (see instance 18)	Energy_port (see instance 23)
1583	Connector_of_facility (see instance 18)	Material_port (see instance 26)
1584	Connector_of_facility (see instance 18)	Signal_port (see instance 29)
1585	Control_and_monitoring_system (see instance 288)	Control_system (see instance 88)
1586	Control_and_monitoring_system (see instance 288)	Emergency_shut_down_system (see instance 305)
1587	Control_and_monitoring_system (see instance 288)	Fire_detection_system (see instance 308)
1588	Control_and_monitoring_system (see instance 288)	Instrumentation_system (see instance 145)
1589	Control_and_monitoring_system (see instance 288)	Machine_monitoring_system (see instance 160)
1590	Control_and_monitoring_system (see instance 288)	Monitoring_system (see instance 330)
1591	Control_and_monitoring_system (see instance 288)	Process_control_system (see instance 195)
1592	Control_loop (see instance 87)	Local_control_loop (see instance 156)
1593	Control_loop (see instance 87)	Remote_control_loop (see instance 204)
1594	Control_system (see instance 88)	Distributed_control_system (see instance 103)
1595	Control_system (see instance 88)	Programmable_logic_controller (see instance 196)
1596	Control_system_component (see instance 89)	Audible_device (see instance 77)
1597	Control_system_component (see instance 89)	Controller (see instance 90)
1598	Control_system_component (see instance 89)	Final_control_device (see instance 113)

Table M.40 – Specified instances of Classification_of_class_of_facility (continued)

inst.	classifier (broader class)	classified (narrower class)
1599	Control_system_component (see instance 89)	Measuring_device (see instance 163)
1600	Control_system_component (see instance 89)	Relay (see instance 203)
1601	Control_system_component (see instance 89)	Transducer (see instance 232)
1602	Control_valve (see instance 446)	Automatic_control_valve (see instance 439)
1603	Control_valve (see instance 446)	Mixing_valve (see instance 454)
1604	Control_valve (see instance 446)	Pressure_reducing_valve (see instance 457)
1605	Controller (see instance 90)	Batch_controller (see instance 80)
1606	Controller (see instance 90)	Communications_controller (see instance 84)
1607	Controller (see instance 90)	Flow_controller (see instance 118)
1608	Controller (see instance 90)	Indicator_controller (see instance 139)
1609	Controller (see instance 90)	Level_controller (see instance 147)
1610	Controller (see instance 90)	Recording_controller (see instance 199)
1611	Controller (see instance 90)	Speed_controller (see instance 215)
1612	Cooler (see instance 45)	Air_cooler (see instance 39)
1613	Cooler (see instance 45)	Chiller (see instance 43)
1614	Cooler (see instance 45)	Condenser (see instance 44)
1615	Cooler (see instance 45)	Freezer (see instance 55)
1616	Cooler (see instance 45)	Refrigeration_system (see instance 344)
1617	Cooler (see instance 45)	Sample_cooler (see instance 207)
1618	Crystalliser (see instance 47)	Freeze_condenser (see instance 54)
1619	Density_analyser (see instance 92)	Gas_density_analyser (see instance 126)
1620	Density_analyser (see instance 92)	Liquid_density_analyser (see instance 155)
1621	Desuperheater (see instance 48)	Steam_desuperheater (see instance 64)
1622	Detector (see instance 93)	Automatic_detector (see instance 78)

Table M.40 – Specified instances of Classification_of_class_of_facility (continued)

inst.	classifier (broader class)	classified (narrower class)
1623	Detector (see instance 93)	Oscillation_detector (see instance 177)
1624	Detector (see instance 93)	Switch (see instance 221)
1625	Detector (see instance 93)	Temperature_detector (see instance 224)
1626	Detector (see instance 93)	Vibration_detector (see instance 235)
1627	Detector (see instance 93)	Water_detector (see instance 241)
1628	Dew_point_analyser (see instance 94)	Instrument_air_water_dew_point_analyser (see instance 143)
1629	Distillation_column (see instance 477)	Scrubber (see instance 501)
1630	Distillation_column (see instance 477)	Splitter (see instance 506)
1631	Distillation_column (see instance 477)	Stripper (see instance 508)
1632	Distillation_unit (see instance 478)	Debutaniser (see instance 473)
1633	Distillation_unit (see instance 478)	Deethaniser (see instance 474)
1634	Distillation_unit (see instance 478)	Depropaniser (see instance 475)
1635	Distillation_unit (see instance 478)	Main_fractionator (see instance 492)
1636	Distribution_network (see instance 293)	Piping_system (see instance 335)
1637	Diverter_valve (see instance 448)	Four_way_valve (see instance 452)
1638	Drain (see instance 479)	Casing_drain (see instance 373)
1639	Drainage_system (see instance 296)	Drainage_culvert (see instance 295)
1640	Drilling_rig (see instance 297)	Fixed_drilling_rig (see instance 310)
1641	Drilling_rig (see instance 297)	Mobile_land_drilling_rig (see instance 328)
1642	Driver (see instance 389)	Electric_motor (see instance 391)
1643	Driver (see instance 389)	Engine (see instance 393)
1644	Driver (see instance 389)	Turbine (see instance 434)
1645	Drum (see instance 481)	Knock_out_drum (see instance 491)

Table M.40 – Specified instances of Classification_of_class_of_facility (continued)

inst.	classifier (broader class)	classified (narrower class)
1646	Effluent_treatment_system (see instance 298)	Drainage_system (see instance 296)
1647	Effluent_treatment_system (see instance 298)	Final_treatment_basin (see instance 307)
1648	Electric_power_station (see instance 303)	Combined_cycle_power_station (see instance 285)
1649	Electric_power_station (see instance 303)	Nuclear_power_station (see instance 333)
1650	Electrical_energy_system (see instance 299)	Electric_power_generation_unit (see instance 302)
1651	Electrical_energy_system (see instance 299)	Uninterrupted_power_supply_system (see instance 358)
1652	Electrical_network (see instance 300)	Electric_power_distribution_system (see instance 301)
1653	Electrical_port (see instance 22)	Electrical_energy_port (see instance 21)
1654	Electrical_system (see instance 304)	Lighting_system (see instance 323)
1655	Energy_port (see instance 23)	Electrical_energy_port (see instance 21)
1656	Energy_system (see instance 306)	Electric_power_distribution_system (see instance 301)
1657	Energy_system (see instance 306)	Electrical_energy_system (see instance 299)
1658	Engine (see instance 393)	Steam_engine (see instance 430)
1659	Expander_system (see instance 395)	Cryogenic_expander (see instance 384)
1660	Expander_system (see instance 395)	Liquid_expander (see instance 406)
1661	Facility_assembly (see instance 33)	Facility_network (see instance 37)
1662	Facility_assembly (see instance 33)	Instrument_connection_assembly (see instance 252)
1663	Facility_assembly (see instance 33)	Loop (see instance 158)
1664	Facility_assembly (see instance 33)	System (see instance 354)
1665	Facility_branch (see instance 34)	Piping_branch (see instance 262)
1666	Facility_collection (see instance 36)	Facility_catalogue (see instance 35)
1667	Facility_network (see instance 37)	Distribution_network (see instance 293)
1668	Facility_network (see instance 37)	Electrical_network (see instance 300)

Table M.40 – Specified instances of Classification_of_class_of_facility (continued)

inst.	classifier (broader class)	classified (narrower class)
1669	Facility_network (see instance 37)	Instrument_network (see instance 320)
1670	Facility_network (see instance 37)	Inter_plant_network (see instance 322)
1671	Facility_network (see instance 37)	Intra_plant_network (see instance 321)
1672	Facility_network (see instance 37)	Piping_network (see instance 263)
1673	Facility_node (see instance 38)	Manifold (see instance 255)
1674	Facility_node (see instance 38)	Network_terminator_node (see instance 258)
1675	Facility_node (see instance 38)	Piping_node (see instance 264)
1676	Filter (see instance 248)	Air_filter (see instance 368)
1677	Filter (see instance 248)	Dewaxing_filter (see instance 388)
1678	Filter (see instance 248)	In_line_filter (see instance 251)
1679	Filter (see instance 248)	Inlet_screen (see instance 405)
1680	Filter (see instance 248)	Membrane (see instance 493)
1681	Filter (see instance 248)	Non_in_line_filter (see instance 260)
1682	Filter (see instance 248)	Oil_filter (see instance 412)
1683	Filter (see instance 248)	Pressure_filter (see instance 268)
1684	Filter (see instance 248)	Strainer (see instance 275)
1685	Final_control_device (see instance 113)	Control_valve (see instance 446)
1686	Fired_heat_transfer_system (see instance 52)	Furnace (see instance 56)
1687	Flash_point_analyser (see instance 117)	Lubrication_oil_flash_point_analyser (see instance 159)
1688	Flue_gas_analyser (see instance 124)	SO2_in_flue_gas_analyser (see instance 214)
1689	Fluid_port (see instance 24)	Drain_nozzle (see instance 20)
1690	Fluid_port (see instance 24)	Process_nozzle (see instance 28)
1691	Fluid_port (see instance 24)	Steam_out_nozzle (see instance 30)
1692	Fluid_port (see instance 24)	Vent_nozzle (see instance 32)
1693	Foot_valve (see instance 450)	Foot_valve_with_strainer (see instance 451)

Table M.40 – Specified instances of Classification_of_class_of_facility (continued)

inst.	classifier (broader class)	classified (narrower class)
1694	Fossil_fuel_supply_system (see instance 314)	Gas_turbine_fuel_system (see instance 317)
1695	Freezer (see instance 55)	Flaker (see instance 53)
1696	Furnace (see instance 56)	Hot_oil_furnace (see instance 60)
1697	Gas_density_analyser (see instance 126)	Relative_gas_density_analyser (see instance 202)
1698	Gas_detection_system (see instance 315)	Gas_alarm_system (see instance 125)
1699	Gas_distribution_system (see instance 316)	Compressed_air_system (see instance 287)
1700	Gas_turbine (see instance 401)	Power_generation_gas_turbine (see instance 416)
1701	Gauge (see instance 128)	Flow_gauge (see instance 120)
1702	Gauge (see instance 128)	Level_gauge (see instance 148)
1703	Gauge (see instance 128)	Pressure_gauge (see instance 188)
1704	Gauge (see instance 128)	Tank_gauge (see instance 222)
1705	H2S_analyser (see instance 130)	H2S_in_air_analyser (see instance 131)
1706	Heat_exchanger (see instance 57)	Cooler (see instance 45)
1707	Heat_exchanger (see instance 57)	Desuperheater (see instance 48)
1708	Heat_exchanger (see instance 57)	Scraped_heat_exchanger (see instance 63)
1709	Heat_exchanger (see instance 57)	Superheater (see instance 67)
1710	Heat_transfer_system (see instance 58)	Boiler (see instance 42)
1711	Heat_transfer_system (see instance 58)	Drier (see instance 49)
1712	Heat_transfer_system (see instance 58)	Evaporator (see instance 51)
1713	Heat_transfer_system (see instance 58)	Fired_heat_transfer_system (see instance 52)
1714	Heat_transfer_system (see instance 58)	Heater (see instance 59)
1715	Heat_transfer_system (see instance 58)	Reboiler (see instance 62)
1716	Heat_transfer_system (see instance 58)	Unfired_heat_transfer_system (see instance 68)
1717	Heater (see instance 59)	Air_heater (see instance 40)
1718	Heater (see instance 59)	Electric_heater (see instance 50)

Table M.40 – Specified instances of Classification_of_class_of_facility (continued)

inst.	classifier (broader class)	classified (narrower class)
1719	Heater (see instance 59)	Lubricating_oil_heater (see instance 407)
1720	Heater (see instance 59)	Preheater (see instance 61)
1721	Indicator (see instance 138)	Local_indicator (see instance 157)
1722	Indicator (see instance 138)	Multi_point_indicator (see instance 168)
1723	Inlet (see instance 25)	Suction_port (see instance 31)
1724	Instrument (see instance 140)	Amplifier (see instance 75)
1725	Instrument (see instance 140)	Field_instrument (see instance 109)
1726	Instrument (see instance 140)	Indicator (see instance 138)
1727	Instrument (see instance 140)	Level_instrument (see instance 149)
1728	Instrument (see instance 140)	Measuring_device (see instance 163)
1729	Instrument (see instance 140)	Oscillator (see instance 178)
1730	Instrument (see instance 140)	Pressure_instrument (see instance 189)
1731	Instrument (see instance 140)	Recorder (see instance 198)
1732	Instrument (see instance 140)	Regulator (see instance 201)
1733	Instrument (see instance 140)	Sampler (see instance 208)
1734	Instrument (see instance 140)	Sensor (see instance 211)
1735	Instrument (see instance 140)	Temperature_instrument (see instance 225)
1736	Instrument_connection_assembly (see instance 252)	Level_instrument_connection_assembly (see instance 253)
1737	Instrument_connection_assembly (see instance 252)	Pressure_instrument_connection_assembly (see instance 269)
1738	Instrument_connection_assembly (see instance 252)	Temperature_instrument_connection_assembly (see instance 278)
1739	Instrumentation_system (see instance 145)	Telemetry_system (see instance 223)
1740	Lamp (see instance 146)	Alarm_lamp (see instance 73)
1741	Level_instrument (see instance 149)	Level_switch (see instance 152)
1742	Level_instrument (see instance 149)	Level_transmitter (see instance 153)
1743	Level_measuring_device (see instance 150)	Dip_tube (see instance 101)
1744	Logical_information_carrier (see 4.2.108)	Computer_file (see instance 513)

Table M.40 – Specified instances of Classification_of_class_of_facility (continued)

inst.	classifier (broader class)	classified (narrower class)
1745	Loop (see instance 158)	Control_loop (see instance 87)
1746	Loop (see instance 158)	Safe_guarding_loop (see instance 205)
1747	Lubrication_system (see instance 408)	Air_lubricator (see instance 71)
1748	Lubrication_system (see instance 408)	Constant_level_oiler (see instance 379)
1749	Manifold (see instance 255)	Collection_manifold (see instance 244)
1750	Manifold (see instance 255)	Distribution_manifold (see instance 246)
1751	Manual_switch (see instance 162)	Push_button (see instance 197)
1752	Manual_switch (see instance 162)	Selector (see instance 210)
1753	Marine_system (see instance 326)	Marine_mooring_system (see instance 325)
1754	Material_port (see instance 26)	Fluid_port (see instance 24)
1755	Material_port (see instance 26)	Inlet (see instance 25)
1756	Material_port (see instance 26)	Outlet (see instance 27)
1757	Measuring_device (see instance 163)	Differential_pressure_measuring_device (see instance 95)
1758	Measuring_device (see instance 163)	Differential_temperature_measuring_device (see instance 99)
1759	Measuring_device (see instance 163)	Flow_measuring_device (see instance 121)
1760	Measuring_device (see instance 163)	Gauge (see instance 128)
1761	Measuring_device (see instance 163)	Level_measuring_device (see instance 150)
1762	Measuring_device (see instance 163)	Meter (see instance 165)
1763	Measuring_device (see instance 163)	Pressure_measuring_device (see instance 190)
1764	Measuring_device (see instance 163)	Temperature_measuring_device (see instance 226)
1765	Meter (see instance 165)	Accelerometer (see instance 70)
1766	Meter (see instance 165)	Conductivity_meter (see instance 86)
1767	Meter (see instance 165)	Current_meter (see instance 91)
1768	Meter (see instance 165)	Differential_pressure_meter (see instance 96)

Table M.40 – Specified instances of Classification_of_class_of_facility (continued)

inst.	classifier (broader class)	classified (narrower class)
1769	Meter (see instance 165)	Duration_meter (see instance 104)
1770	Meter (see instance 165)	Electro_magnetic_meter (see instance 107)
1771	Meter (see instance 165)	Flow_meter (see instance 122)
1772	Meter (see instance 165)	Humidity_meter (see instance 134)
1773	Meter (see instance 165)	Level_meter (see instance 151)
1774	Meter (see instance 165)	PNA_meter (see instance 182)
1775	Meter (see instance 165)	Ph_meter (see instance 180)
1776	Meter (see instance 165)	Position_meter (see instance 186)
1777	Meter (see instance 165)	Pressure_meter (see instance 191)
1778	Meter (see instance 165)	Speed_meter (see instance 216)
1779	Meter (see instance 165)	Temperature_meter (see instance 227)
1780	Meter (see instance 165)	Vibration_meter (see instance 236)
1781	Meter (see instance 165)	Voltage_meter (see instance 239)
1782	Mist_detector (see instance 166)	Oil_mist_detector (see instance 175)
1783	Mixer (see instance 410)	In_line_mixer (see instance 249)
1784	Mixer (see instance 410)	Solid_mixer (see instance 428)
1785	Mixer (see instance 410)	Tank_mixer (see instance 435)
1786	Monitoring_system (see instance 330)	Corrosion_monitoring_system (see instance 289)
1787	Monitoring_system (see instance 330)	Vibration_monitoring_system (see instance 237)
1788	Mud_valve (see instance 456)	Mud_discharge_valve (see instance 455)
1789	Outlet (see instance 27)	Catalyst_drop_out_nozzle (see instance 17)
1790	Outlet (see instance 27)	Discharge_port (see instance 19)
1791	Oxygen_analyser (see instance 179)	O2_in_flue_gas_analyser (see instance 172)
1792	Oxygen_analyser (see instance 179)	O2_in_process_analyser (see instance 173)
1793	Pipeline (see instance 261)	Discharge_pipeline (see instance 292)

Table M.40 – Specified instances of Classification_of_class_of_facility (continued)

inst.	classifier (broader class)	classified (narrower class)
1794	Piping (see instance 715)	Instrument_air_piping (see instance 141)
1795	Piping_network (see instance 263)	Gas_distribution_system (see instance 316)
1796	Piping_system (see instance 335)	Catalyst_piping (see instance 470)
1797	Piping_system (see instance 335)	Cooling_water_piping (see instance 381)
1798	Piping_system (see instance 335)	Discharge_piping (see instance 390)
1799	Piping_system (see instance 335)	Exhaust_piping (see instance 394)
1800	Piping_system (see instance 335)	Expansion_bend (see instance 247)
1801	Piping_system (see instance 335)	Loading_hose (see instance 254)
1802	Piping_system (see instance 335)	Manifold (see instance 255)
1803	Piping_system (see instance 335)	Meter_run_assembly (see instance 256)
1804	Piping_system (see instance 335)	Pipeline (see instance 261)
1805	Piping_system (see instance 335)	Piping_segment (see instance 266)
1806	Piping_system (see instance 335)	Pump_motor_pressure_balancing_tube (see instance 417)
1807	Piping_system (see instance 335)	Riser (see instance 270)
1808	Piping_system (see instance 335)	Seal_flush_piping (see instance 423)
1809	Piping_system (see instance 335)	Steam_piping (see instance 431)
1810	Piping_system (see instance 335)	Straightener (see instance 274)
1811	Piping_system (see instance 335)	String (see instance 276)
1812	Piping_system (see instance 335)	Suction_piping (see instance 433)
1813	Piping_system (see instance 335)	Well_head (see instance 281)
1814	Piping_tracer (see instance 267)	Electrical_tracer (see instance 483)
1815	Position_detector (see instance 185)	Pig_position_detector (see instance 181)
1816	Preheater (see instance 61)	Air_preheater (see instance 41)
1817	Pressure_instrument (see instance 189)	Pressure_transmitter (see instance 194)
1818	Process_system (see instance 339)	Process_train (see instance 340)
1819	Pump_system (see instance 420)	Boiler_feed_water_pump (see instance 371)

Table M.40 – Specified instances of Classification_of_class_of_facility (continued)

inst.	classifier (broader class)	classified (narrower class)
1820	Pump_system (see instance 420)	Cooling_water_pump (see instance 382)
1821	Pump_system (see instance 420)	Cryogenic_pump (see instance 385)
1822	Pump_system (see instance 420)	Deep_well_pump (see instance 387)
1823	Pump_system (see instance 420)	Electro_magnetic_pump (see instance 392)
1824	Pump_system (see instance 420)	Fire_fighting_pump (see instance 398)
1825	Pump_system (see instance 420)	Metering_pump (see instance 409)
1826	Pump_system (see instance 420)	Oil_pump (see instance 413)
1827	Pump_system (see instance 420)	Process_pump (see instance 418)
1828	Pump_system (see instance 420)	Self_priming_pump (see instance 427)
1829	Push_button (see instance 197)	Field_push_button (see instance 110)
1830	Reactor (see instance 497)	Hydrocracker_reactor (see instance 487)
1831	Reactor (see instance 497)	Hydrodesulphurizer (see instance 488)
1832	Reactor (see instance 497)	Hydrotreater_reactor (see instance 489)
1833	Reactor (see instance 497)	Platformer_reactor (see instance 496)
1834	Reactor (see instance 497)	Regenerator (see instance 498)
1835	Recorder (see instance 198)	Event_recorder (see instance 108)
1836	Recorder (see instance 198)	Multi_point_recorder (see instance 169)
1837	Relay (see instance 203)	Computing_relay (see instance 85)
1838	Relief_valve (see instance 461)	Air_release_relief_valve (see instance 438)
1839	Relief_valve (see instance 461)	Pressure_relief_valve (see instance 458)
1840	Route (see instance 271)	Piping_route (see instance 265)
1841	Safety_system (see instance 346)	Alarm_system (see instance 74)
1842	Safety_system (see instance 346)	Emergency_shut_down_system (see instance 305)
1843	Safety_system (see instance 346)	Fire_detection_system (see instance 308)
1844	Safety_system (see instance 346)	Fire_fighting_system (see instance 309)
1845	Safety_system (see instance 346)	Gas_detection_system (see instance 315)

Table M.40 – Specified instances of Classification_of_class_of_facility (continued)

inst.	classifier (broader class)	classified (narrower class)
1846	Safety_system (see instance 346)	Pressure_relief_system (see instance 337)
1847	Safety_system (see instance 346)	Safe_guarding_system (see instance 206)
1848	Safety_system (see instance 346)	Venting_system (see instance 362)
1849	Safety_valve (see instance 463)	Pressure_vacuum_safety_valve (see instance 459)
1850	Seal_flush_system (see instance 426)	Compressor_seal_system (see instance 378)
1851	Seal_flush_system (see instance 426)	Expander_seal_system (see instance 396)
1852	Seal_flush_system (see instance 426)	Pump_seal_flush_system (see instance 421)
1853	Selector (see instance 210)	Field_selector (see instance 111)
1854	Sensor (see instance 211)	Detector (see instance 93)
1855	Sensor (see instance 211)	Machine_sensor (see instance 161)
1856	Sensor (see instance 211)	Pressure_sensor (see instance 192)
1857	Sensor (see instance 211)	Temperature_sensor (see instance 228)
1858	Separator (see instance 502)	Centrifuge (see instance 375)
1859	Separator (see instance 502)	Coalescer (see instance 471)
1860	Separator (see instance 502)	Crystalliser (see instance 47)
1861	Separator (see instance 502)	Cyclone (see instance 472)
1862	Separator (see instance 502)	Gas_solid_separator (see instance 486)
1863	Separator (see instance 502)	Settlement_basin (see instance 347)
1864	Separator (see instance 502)	Settler (see instance 504)
1865	Separator (see instance 502)	Three_phase_separator (see instance 510)
1866	Signal_line (see instance 212)	Instrument_signal_line (see instance 144)
1867	Signal_line (see instance 212)	Optical_signal_line (see instance 176)
1868	Starting_system (see instance 429)	Air_starting_system (see instance 369)
1869	Starting_system (see instance 429)	Battery_start_system (see instance 370)
1870	Storage_system (see instance 352)	Bulk_product_compartment (see instance 468)

Table M.40 – Specified instances of Classification_of_class_of_facility (continued)

inst.	classifier (broader class)	classified (narrower class)
1871	Storage_system (see instance 352)	Catalyst_hopper (see instance 469)
1872	Storage_system (see instance 352)	Mud_pit (see instance 494)
1873	Storage_system (see instance 352)	Overhead_tank (see instance 415)
1874	Storage_system (see instance 352)	Packed_product_compartment (see instance 495)
1875	Storage_system (see instance 352)	Silo (see instance 505)
1876	Storage_system (see instance 352)	Storage_vessel (see instance 507)
1877	Storage_vessel (see instance 507)	Reservoir (see instance 499)
1878	String (see instance 276)	Completion_string (see instance 245)
1879	Sulphur_analyser (see instance 217)	Mercaptan_analyser (see instance 164)
1880	Sulphur_analyser (see instance 217)	Sulphur_in_gas_analyser (see instance 218)
1881	Sulphur_analyser (see instance 217)	Sulphur_in_oil_analyser (see instance 219)
1882	Switch (see instance 221)	Automatic_switch (see instance 79)
1883	Switch (see instance 221)	Electric_switch (see instance 106)
1884	Switch (see instance 221)	Manual_switch (see instance 162)
1885	Switch (see instance 221)	Pneumatic_switch (see instance 183)
1886	System (see instance 354)	Air_compression_system (see instance 282)
1887	System (see instance 354)	Air_supply_system (see instance 72)
1888	System (see instance 354)	Auxiliary_system (see instance 283)
1889	System (see instance 354)	Communication_system (see instance 286)
1890	System (see instance 354)	Control_and_monitoring_system (see instance 288)
1891	System (see instance 354)	Data_acquisition_system (see instance 291)
1892	System (see instance 354)	Diving_support_system (see instance 294)
1893	System (see instance 354)	Effluent_treatment_system (see instance 298)
1894	System (see instance 354)	Electrical_system (see instance 304)

Table M.40 – Specified instances of Classification_of_class_of_facility (continued)

inst.	classifier (broader class)	classified (narrower class)
1895	System (see instance 354)	Energy_system (see instance 306)
1896	System (see instance 354)	Flare_system (see instance 311)
1897	System (see instance 354)	Flue_gas_system (see instance 312)
1898	System (see instance 354)	HVAC_system (see instance 318)
1899	System (see instance 354)	Heating_system (see instance 403)
1900	System (see instance 354)	Injection_system (see instance 319)
1901	System (see instance 354)	Loading_system (see instance 324)
1902	System (see instance 354)	Marine_system (see instance 326)
1903	System (see instance 354)	Materials_handling_system (see instance 327)
1904	System (see instance 354)	Navigation_system (see instance 331)
1905	System (see instance 354)	Nuclear_fuel_handling_system (see instance 332)
1906	System (see instance 354)	Pig_launching_system (see instance 334)
1907	System (see instance 354)	Pneumatic_system (see instance 184)
1908	System (see instance 354)	Process_system (see instance 339)
1909	System (see instance 354)	Processing_system (see instance 342)
1910	System (see instance 354)	Production_system (see instance 343)
1911	System (see instance 354)	Renewable_energy_system (see instance 345)
1912	System (see instance 354)	Safety_system (see instance 346)
1913	System (see instance 354)	Sampling_system (see instance 209)
1914	System (see instance 354)	Sand_trap_system (see instance 500)
1915	System (see instance 354)	Starter_system (see instance 349)
1916	System (see instance 354)	Steam_system (see instance 351)
1917	System (see instance 354)	Storage_system (see instance 352)
1918	System (see instance 354)	Transportation_system (see instance 356)
1919	System (see instance 354)	Transmission_system (see instance 357)
1920	System (see instance 354)	Utility_system (see instance 360)

Table M.40 – Specified instances of Classification_of_class_of_facility (continued)

inst.	classifier (broader class)	classified (narrower class)
1921	Temperature_instrument (see instance 225)	Temperature_transmitter (see instance 230)
1922	Transducer (see instance 232)	Electric_pneumatic_transducer (see instance 105)
1923	Transducer (see instance 232)	Transmitter (see instance 233)
1924	Transmission_system (see instance 357)	Clutch (see instance 376)
1925	Transmission_system (see instance 357)	Coupling (see instance 383)
1926	Transmission_system (see instance 357)	Variable_drive (see instance 437)
1927	Transmitter (see instance 233)	Differential_pressure_transmitter (see instance 98)
1928	Transmitter (see instance 233)	Flow_transmitter (see instance 123)
1929	Transmitter (see instance 233)	Level_transmitter (see instance 153)
1930	Transmitter (see instance 233)	Pressure_transmitter (see instance 194)
1931	Transmitter (see instance 233)	Temperature_transmitter (see instance 230)
1932	Turbine (see instance 434)	Gas_turbine (see instance 401)
1933	Turbine (see instance 434)	Hydraulic_turbine (see instance 404)
1934	Turbine (see instance 434)	Steam_turbine (see instance 432)
1935	Unfired_heat_transfer_system (see instance 68)	Heat_exchanger (see instance 57)
1936	Unit (see instance 359)	Distillation_unit (see instance 478)
1937	Unit (see instance 359)	Electric_power_generation_unit (see instance 302)
1938	Unit (see instance 359)	Process_unit (see instance 341)
1939	Unit (see instance 359)	Steam_generation_unit (see instance 350)
1940	Unit (see instance 359)	Storage_unit (see instance 353)
1941	Unit (see instance 359)	Utility_unit (see instance 361)
1942	Valve_system (see instance 466)	Bleed_valve (see instance 440)
1943	Valve_system (see instance 466)	Blending_valve (see instance 441)
1944	Valve_system (see instance 466)	Block_valve (see instance 442)

Table M.40 – Specified instances of Classification_of_class_of_facility (concluded)

inst.	classifier (broader class)	classified (narrower class)
1945	Valve_system (see instance 466)	Blow_off_valve (see instance 443)
1946	Valve_system (see instance 466)	Bypass_valve (see instance 444)
1947	Valve_system (see instance 466)	Check_valve (see instance 445)
1948	Valve_system (see instance 466)	Control_valve (see instance 446)
1949	Valve_system (see instance 466)	Diver_operated_valve (see instance 447)
1950	Valve_system (see instance 466)	Diverter_valve (see instance 448)
1951	Valve_system (see instance 466)	Drain_valve (see instance 480)
1952	Valve_system (see instance 466)	In_line_valve (see instance 453)
1953	Valve_system (see instance 466)	Mud_valve (see instance 456)
1954	Valve_system (see instance 466)	Quick_acting_valve (see instance 460)
1955	Valve_system (see instance 466)	Relief_valve (see instance 461)
1956	Valve_system (see instance 466)	Remote_operated_valve (see instance 462)
1957	Valve_system (see instance 466)	Safety_valve (see instance 463)
1958	Valve_system (see instance 466)	Three_way_valve (see instance 465)
1959	Valve_system (see instance 466)	Vent_valve (see instance 511)
1960	Vapour_trap (see instance 279)	Moisture_trap (see instance 257)
1961	Vapour_trap (see instance 279)	Steam_trap (see instance 273)
1962	Vent (see instance 280)	Casing_vent (see instance 374)

M.12 Specified instances of Classification_of_class_of_material

The specified instances of Classification_of_class_of_material (see 4.2.37) are defined in table M.41.

NOTE – Each instance of the AIM entity **standard_classification_of_class_of_material** (see 5.2.3.162) has attributes **relating_group** and **related_group** inherited from **group_relationship**.

The **relating_group** and the **related_group** are both instances of **standard_class_of_material**, and are such that the **relating_group** is the classifier and the **related_group** is the classified. The **name** attributes of the two instances of **standard_class_of_material** form a keyword pair.

The keyword pair is one of those listed in the table in clause M.12 and indicates the corresponding specified instance of Classification_of_class_of_material.

Table M.41 – Specified instances of Classification_of_class_of_material

inst.	classifier (broader class)	classified (narrower class)
1963	Actuator (see instance 1066)	Manual_actuator (see instance 1073)
1964	Actuator (see instance 1066)	Non_manual_actuator (see instance 1075)
1965	Additive (see instance 1292)	Anti_knock_agent (see instance 1295)
1966	Additive (see instance 1292)	Antifluorescence_agent (see instance 1296)
1967	Additive (see instance 1292)	Gelling_agent (see instance 1362)
1968	Additive (see instance 1292)	Inhibitor (see instance 1377)
1969	Additive (see instance 1292)	Pour_point_depressant (see instance 1437)
1970	Additive (see instance 1292)	Thickener (see instance 1480)
1971	Air (see instance 1293)	Instrument_air (see instance 1379)
1972	Air (see instance 1293)	Purge_air (see instance 1445)
1973	Angle_valve (see instance 1012)	Choke_valve (see instance 1020)
1974	Atmospheric_distillate (see instance 1302)	Kerosene (see instance 1384)
1975	Axial_compressor (see instance 761)	Fan (see instance 788)
1976	Axial_flow_impeller (see instance 842)	Inducer (see instance 923)
1977	Axial_flow_impeller (see instance 842)	Propeller (see instance 957)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
1978	Backing_ring (see instance 1118)	Anchor_bolt_ring (see instance 1117)
1979	Baffle (see instance 585)	Longitudinal_baffle (see instance 608)
1980	Baffle (see instance 585)	Transverse_baffle (see instance 620)
1981	Ball_valve (see instance 1015)	Ball_valve_with_integral_drain (see instance 1016)
1982	Base_oil (see instance 1304)	Bright_stock (see instance 1316)
1983	Base_oil (see instance 1304)	Cylinder_stock_oil (see instance 1335)
1984	Basket_filter (see instance 674)	Multiple_basket_filter (see instance 704)
1985	Basket_filter (see instance 674)	Single_basket_filter (see instance 729)
1986	Bearing (see instance 854)	Anti_friction_bearing (see instance 838)
1987	Bearing (see instance 854)	Inboard_impeller_bearing (see instance 922)
1988	Bearing (see instance 854)	Intermediate_impeller_bearing (see instance 925)
1989	Bearing (see instance 854)	Magnetic_bearing (see instance 938)
1990	Bearing (see instance 854)	Outboard_impeller_bearing (see instance 952)
1991	Bearing (see instance 854)	Radial_bearing (see instance 960)
1992	Bearing (see instance 854)	Thrust_bearing (see instance 1001)
1993	Bearing_bracket (see instance 856)	Radial_bearing_bracket (see instance 962)
1994	Bearing_bracket (see instance 856)	Thrust_bearing_bracket (see instance 1002)
1995	Bearing_housing (see instance 860)	Radial_bearing_housing (see instance 963)
1996	Bearing_housing (see instance 860)	Thrust_bearing_housing (see instance 1003)
1997	Bellow (see instance 675)	Articulated_bellow (see instance 673)
1998	Bent_pipe (see instance 676)	Coil (see instance 589)
1999	Binder (see instance 1307)	Bituminous_binder (see instance 1309)
2000	Bitumen (see instance 1308)	Blown_bitumen (see instance 1312)
2001	Bitumen (see instance 1308)	Cut_back_bitumen (see instance 1332)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2002	Bitumen (see instance 1308)	Emulsified_bitumen (see instance 1343)
2003	Bitumen (see instance 1308)	Fluxed_bitumen (see instance 1355)
2004	Blower (see instance 767)	Axial_flow_blower (see instance 762)
2005	Bolt (see instance 1123)	Anchor_bolt (see instance 1116)
2006	Bush (see instance 864)	Cylinder_liner (see instance 880)
2007	Bush (see instance 864)	Floating_ring_seal (see instance 898)
2008	Bush (see instance 864)	Interstage_bushing (see instance 929)
2009	Bush (see instance 864)	Sleeve_bearing (see instance 984)
2010	Bush (see instance 864)	Throat_bushing (see instance 998)
2011	Bush (see instance 864)	Throttle_bushing (see instance 999)
2012	Butane (see instance 1317)	Commercial_butane (see instance 1327)
2013	Butane (see instance 1317)	Iso-butane (see instance 1381)
2014	Butane (see instance 1317)	Normal_butane (see instance 1417)
2015	Butterfly_valve (see instance 1019)	Double_disc_butterfly_valve (see instance 1024)
2016	Can (see instance 865)	Spacer_can (see instance 985)
2017	Can (see instance 865)	Stator_can (see instance 989)
2018	Can (see instance 865)	Suction_can (see instance 994)
2019	Carbon (see instance 1320)	Carbon_black (see instance 1321)
2020	Carbon (see instance 1320)	Petroleum_coke (see instance 1433)
2021	Casing (see instance 867)	Barrel (see instance 852)
2022	Casing (see instance 867)	Can (see instance 865)
2023	Casing (see instance 867)	Inner_casing (see instance 924)
2024	Casing (see instance 867)	Motor_casing (see instance 945)
2025	Casing (see instance 867)	Stage_casing (see instance 987)
2026	Centrifugal_pump (see instance 774)	Canned_motor_pump (see instance 772)
2027	Centrifugal_pump (see instance 774)	High_speed_pump (see instance 794)
2028	Centrifugal_pump (see instance 774)	Horizontal_centrifugal_pump (see instance 795)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2029	Centrifugal_pump (see instance 774)	Magnetic_pump (see instance 803)
2030	Centrifugal_pump (see instance 774)	Multi_stage_centrifugal_pump (see instance 804)
2031	Centrifugal_pump (see instance 774)	Single_stage_centrifugal_pump (see instance 825)
2032	Centrifugal_pump (see instance 774)	Submerged_centrifugal_pump (see instance 827)
2033	Centrifugal_pump (see instance 774)	Two_stage_centrifugal_pump (see instance 828)
2034	Centrifugal_pump (see instance 774)	Vertical_centrifugal_pump (see instance 831)
2035	Centrifugal_pump (see instance 774)	Vertical_inline_pump (see instance 833)
2036	Centrifugal_pump (see instance 774)	Vertical_lineshaft_pump (see instance 834)
2037	Choke_valve (see instance 1020)	Adjustable_choke_valve (see instance 1011)
2038	Choke_valve (see instance 1020)	Fixed_choke_valve (see instance 1027)
2039	Choke_valve (see instance 1020)	Subsea_choke_valve (see instance 1060)
2040	Clip (see instance 1132)	Fire_proofing_support_clip (see instance 1148)
2041	Clip (see instance 1132)	Insulation_support_clip (see instance 1157)
2042	Clip (see instance 1132)	Ladder_support_clip (see instance 1160)
2043	Clip (see instance 1132)	Pipe_support_clip (see instance 714)
2044	Clip (see instance 1132)	Platform_support (see instance 1175)
2045	Clip (see instance 1132)	Vessel_davit_support_clip (see instance 1202)
2046	Close_coupled_pump (see instance 775)	Close_coupled_vertical_inline_pump (see instance 776)
2047	Collar (see instance 873)	Seal_collar (see instance 973)
2048	Column (see instance 1084)	Rotating_disc_contactor (see instance 1106)
2049	Compressor_equipment (see instance 777)	Impulse_compressor (see instance 797)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2050	Compressor_equipment (see instance 777)	Positive_displacement_compressor (see instance 809)
2051	Compressor_or_expander_seal (see instance 876)	Compressor_seal (see instance 877)
2052	Compressor_or_expander_seal (see instance 876)	Dry_gas_seal (see instance 892)
2053	Compressor_or_expander_seal (see instance 876)	Expander_seal (see instance 896)
2054	Compressor_or_expander_seal (see instance 876)	Iso_sleeve_seal (see instance 932)
2055	Compressor_or_expander_seal (see instance 876)	Mechanical_contact_seal (see instance 941)
2056	Compressor_seal (see instance 877)	Restrictive_ring_seal (see instance 964)
2057	Conduit_gate_valve (see instance 1021)	Slab_gate_valve (see instance 1053)
2058	Connector (see instance 542)	Bearing_circlip_ring (see instance 859)
2059	Connector (see instance 542)	Expansion_joint (see instance 595)
2060	Connector (see instance 542)	Hydraulic_coupler (see instance 1072)
2061	Connector (see instance 542)	Vibration_connector (see instance 653)
2062	Coupling (see instance 383)	Diaphragm_coupling (see instance 882)
2063	Coupling (see instance 383)	Gear_type_coupling (see instance 904)
2064	Coupling (see instance 383)	Magnetic_coupling (see instance 939)
2065	Coupling_guard (see instance 878)	Non_sparking_enclosure (see instance 949)
2066	Cover (see instance 879)	Bearing_cap (see instance 858)
2067	Cover (see instance 879)	Discharge_cover (see instance 885)
2068	Cover (see instance 879)	Head (see instance 603)
2069	Cover (see instance 879)	Impeller_back (see instance 913)
2070	Cover (see instance 879)	Impeller_front (see instance 914)
2071	Cover (see instance 879)	Motor_casing_cover (see instance 946)
2072	Cover (see instance 879)	Shell_cover (see instance 612)
2073	Cover (see instance 879)	Suction_cover (see instance 995)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2074	Crude_oil (see instance 1331)	Asphaltic_crude_oil (see instance 1299)
2075	Crude_oil (see instance 1331)	Naphthenic_crude_oil (see instance 1405)
2076	Crude_oil (see instance 1331)	Paraffinic_crude_oil (see instance 1427)
2077	Crude_oil (see instance 1331)	Reduced_crude (see instance 1446)
2078	Crude_oil (see instance 1331)	Sour_crude (see instance 1464)
2079	Crude_oil (see instance 1331)	Sweet_crude (see instance 1477)
2080	Diffuser (see instance 883)	Axial_diffuser (see instance 841)
2081	Distillation_component (see instance 1339)	Industrial_component_fraction (see instance 1375)
2082	Distillation_component (see instance 1339)	Pseudo_component (see instance 1443)
2083	Distillation_component (see instance 1339)	Pure_component (see instance 1444)
2084	Document (see instance 1213)	A0_document (see instance 1208)
2085	Document (see instance 1213)	A1_document (see instance 1209)
2086	Document (see instance 1213)	A2_document (see instance 1210)
2087	Document (see instance 1213)	A3_document (see instance 1211)
2088	Document (see instance 1213)	A4_document (see instance 1212)
2089	Document (see instance 1213)	Drawing (see instance 1214)
2090	Document (see instance 1213)	Drawing_sheet (see instance 1215)
2091	Document (see instance 1213)	Landscape_format_document (see instance 1216)
2092	Document (see instance 1213)	Portrait_format_document (see instance 1217)
2093	Downcomer (see instance 1145)	Sloped_downcomer (see instance 1184)
2094	Downcomer (see instance 1145)	Stepped_downcomer (see instance 1185)
2095	Downcomer (see instance 1145)	Straight_downcomer (see instance 1186)
2096	Drawn_fluid_pump (see instance 783)	Cable_pump (see instance 771)
2097	Drawn_fluid_pump (see instance 783)	Extrusion_drawn_fluid_pump (see instance 787)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2098	Eccentric_reducer (see instance 690)	Bottom_flat_eccentric_reducer (see instance 678)
2099	Ejector (see instance 785)	Steam_ejector (see instance 826)
2100	Elbow (see instance 691)	Discharge_elbow (see instance 886)
2101	Elbow (see instance 691)	Reflux_elbow (see instance 1165)
2102	Electric_motor (see instance 391)	Vertical_electric_motor (see instance 832)
2103	Electric_motor (see instance 391)	Variable_speed_motor (see instance 830)
2104	Electrical_actuator (see instance 1069)	Motor_operated_actuator (see instance 1074)
2105	Enclosure (see instance 543)	Cabinet (see instance 627)
2106	Enclosure (see instance 543)	Casing (see instance 867)
2107	Enclosure (see instance 543)	Hood (see instance 908)
2108	Equipment (see instance 751)	Ball_mill (see instance 765)
2109	Equipment (see instance 751)	Bourdon_tube (see instance 626)
2110	Equipment (see instance 751)	Chromatograph (see instance 628)
2111	Equipment (see instance 751)	Compressor_equipment (see instance 777)
2112	Equipment (see instance 751)	Differential_pressure_flow_meter (see instance 630)
2113	Equipment (see instance 751)	Ejector (see instance 785)
2114	Equipment (see instance 751)	Equipment_assembly (see instance 752)
2115	Equipment (see instance 751)	Expander_equipment (see instance 786)
2116	Equipment (see instance 751)	Infra_red_analyser (see instance 632)
2117	Equipment (see instance 751)	Infra_red_detector (see instance 633)
2118	Equipment (see instance 751)	In_line_measuring_device (see instance 631)
2119	Equipment (see instance 751)	Main_equipment (see instance 753)
2120	Equipment (see instance 751)	Manometer (see instance 635)
2121	Equipment (see instance 751)	Mechanical_equipment (see instance 754)
2122	Equipment (see instance 751)	Panel_instrument (see instance 639)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2123	Equipment (see instance 751)	Pitot_tube_flow_meter (see instance 640)
2124	Equipment (see instance 751)	Positive_displacement_flow_meter (see instance 641)
2125	Equipment (see instance 751)	Pump_equipment (see instance 812)
2126	Equipment (see instance 751)	Rotameter (see instance 642)
2127	Equipment (see instance 751)	Rotating_equipment (see instance 820)
2128	Equipment (see instance 751)	Safety_equipment (see instance 756)
2129	Equipment (see instance 751)	Sightglass (see instance 643)
2130	Equipment (see instance 751)	Sump (see instance 618)
2131	Equipment (see instance 751)	Thermocouple (see instance 644)
2132	Equipment (see instance 751)	Touch_button (see instance 645)
2133	Equipment (see instance 751)	Ultrasonic_transmitter (see instance 648)
2134	Equipment (see instance 751)	Ultra_violet_detector (see instance 649)
2135	Equipment (see instance 751)	Ultrasonic_meter (see instance 651)
2136	Equipment (see instance 751)	Vacuum_equipment (see instance 1110)
2137	Equipment (see instance 751)	Vessel (see instance 1113)
2138	Equipment (see instance 751)	Weir (see instance 624)
2139	Equipment_assembly (see instance 752)	Vessel_assembly (see instance 1114)
2140	Equipment_component (see instance 594)	Bearing (see instance 854)
2141	Equipment_component (see instance 594)	Bearing_assembly (see instance 855)
2142	Equipment_component (see instance 594)	Bearing_bracket (see instance 856)
2143	Equipment_component (see instance 594)	Clip (see instance 1132)
2144	Equipment_component (see instance 594)	Collar (see instance 873)
2145	Equipment_component (see instance 594)	Cover (see instance 879)
2146	Equipment_component (see instance 594)	Discharge_column (see instance 884)
2147	Equipment_component (see instance 594)	Earthing_lug (see instance 1146)
2148	Equipment_component (see instance 594)	Foot_valve_adapter (see instance 900)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2149	Equipment_component (see instance 594)	Gland_plate (see instance 905)
2150	Equipment_component (see instance 594)	Lifting_lug (see instance 934)
2151	Equipment_component (see instance 594)	Name_plate (see instance 1169)
2152	Equipment_component (see instance 594)	Nozzle_head (see instance 950)
2153	Equipment_component (see instance 594)	Plate (see instance 610)
2154	Equipment_component (see instance 594)	Radial_bearing_assembly (see instance 961)
2155	Equipment_component (see instance 594)	Reinforcing_ring (see instance 1178)
2156	Equipment_component (see instance 594)	Ring (see instance 611)
2157	Equipment_component (see instance 594)	Rotating_equipment_component (see instance 966)
2158	Equipment_component (see instance 594)	Seal (see instance 971)
2159	Equipment_component (see instance 594)	Shaft (see instance 978)
2160	Equipment_component (see instance 594)	Sleeve (see instance 983)
2161	Equipment_component (see instance 594)	Stator (see instance 988)
2162	Equipment_component (see instance 594)	Steel_cable_guard (see instance 990)
2163	Equipment_component (see instance 594)	Suction_bowl (see instance 993)
2164	Equipment_component (see instance 594)	Support_column (see instance 996)
2165	Equipment_component (see instance 594)	Thrust_bearing_plate (see instance 1004)
2166	Equipment_component (see instance 594)	Vane (see instance 1008)
2167	Fan (see instance 788)	Natural_draft_fan (see instance 805)
2168	Finned_tube (see instance 598)	Embedded_finned_tube (see instance 593)
2169	Finned_tube (see instance 598)	Integral_finned_tube (see instance 607)
2170	Float_valve (see instance 1029)	Float_valve_with_mechanical_link (see instance 1030)
2171	Flow_measuring_element (see instance 656)	Venturi (see instance 670)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2172	Fluid (see instance 1353)	Cleaning_fluid (see instance 1325)
2173	Fluid (see instance 1353)	Damping_fluid (see instance 1336)
2174	Fluid (see instance 1353)	Newtonian_fluid (see instance 1410)
2175	Fluid (see instance 1353)	Non_newtonian_fluid (see instance 1415)
2176	Forced_draught_furnace (see instance 555)	Forced_down_draught_furnace (see instance 553)
2177	Forced_draught_furnace (see instance 555)	Forced_up_draught_furnace (see instance 556)
2178	Fraction (see instance 1356)	Bottom_fraction (see instance 1315)
2179	Fraction (see instance 1356)	C7_plus_fraction (see instance 1318)
2180	Fraction (see instance 1356)	Narrow_fraction (see instance 1406)
2181	Fraction (see instance 1356)	Petroleum_distillate (see instance 1430)
2182	Fraction (see instance 1356)	Top_fraction (see instance 1481)
2183	Fraction (see instance 1356)	Wide_fraction (see instance 1494)
2184	Frame (see instance 657)	Rack (see instance 666)
2185	Fuel (see instance 1357)	Fuel_oil (see instance 1358)
2186	Fuel (see instance 1357)	Jet_fuel (see instance 1383)
2187	Fuel (see instance 1357)	Natural_gas (see instance 1407)
2188	Fuel (see instance 1357)	Residual_fuel (see instance 1449)
2189	Fuel (see instance 1357)	Standard_refinery_fuel (see instance 1467)
2190	Gas (see instance 1359)	Air (see instance 1293)
2191	Gas (see instance 1359)	Associated_gas (see instance 1301)
2192	Gas (see instance 1359)	Flared_gas (see instance 1351)
2193	Gas (see instance 1359)	Flue_gas (see instance 1352)
2194	Gas (see instance 1359)	Natural_gas (see instance 1407)
2195	Gasket (see instance 901)	Casing_gasket (see instance 868)
2196	Gasket (see instance 901)	Impeller_gasket (see instance 915)
2197	Gasket (see instance 901)	O_ring (see instance 951)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2198	Gasoline (see instance 1361)	Aviation_gasoline (see instance 1303)
2199	Gasoline (see instance 1361)	Motor_gasoline (see instance 1403)
2200	Gasoline (see instance 1361)	Natural_gasoline (see instance 1409)
2201	Gasoline (see instance 1361)	Straight_run_gasoline (see instance 1470)
2202	Gasoline (see instance 1361)	Sweet_gasoline (see instance 1478)
2203	Gate_valve (see instance 1031)	Hose_gate_valve (see instance 1035)
2204	Gate_valve (see instance 1031)	Knife_gate_valve (see instance 1038)
2205	Gate_valve (see instance 1031)	Parallel_gate_valve (see instance 1044)
2206	Gear (see instance 902)	Spur_gear (see instance 986)
2207	Gate_valve (see instance 1031)	Parallel_slide_valve (see instance 1046)
2208	Gate_valve (see instance 1031)	Penstock_valve (see instance 1047)
2209	Gate_valve (see instance 1031)	Wedge_gate_valve (see instance 1064)
2210	Gear (see instance 902)	Pinion_gear (see instance 954)
2211	Gear_box (see instance 903)	Angle_gear_box (see instance 837)
2212	Gear_box (see instance 903)	Epicyclic_gear_box (see instance 894)
2213	Gear_box (see instance 903)	Parallel_gear_box (see instance 953)
2214	Gear_box (see instance 903)	Right_angle_gear_box (see instance 965)
2215	Gear_box (see instance 903)	Step_down_gear_box (see instance 991)
2216	Gear_box (see instance 903)	Step_up_gear_box (see instance 992)
2217	Gear_pump (see instance 793)	Rotary_internal_gear_pump (see instance 816)
2218	Globe_valve (see instance 1032)	Angle_valve (see instance 1012)
2219	Globe_valve (see instance 1032)	Double_disc_globe_valve (see instance 1025)
2220	Globe_valve (see instance 1032)	Hose_globe_valve (see instance 1036)
2221	Globe_valve (see instance 1032)	Needle_valve (see instance 1043)
2222	Globe_valve (see instance 1032)	Piston_valve (see instance 1049)
2223	Graphite_heat_exchanger (see instance 558)	Graphite_cubic_block_heat_exchanger (see instance 557)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2224	Hand_operated_valve (see instance 1033)	Hand_valve (see instance 1034)
2225	Head (see instance 603)	Floating_head (see instance 600)
2226	Head (see instance 603)	Front_end_head (see instance 602)
2227	Head (see instance 603)	Stationary_head (see instance 616)
2228	Heat_exchanger_component (see instance 604)	Backing_device (see instance 584)
2229	Heat_exchanger_component (see instance 604)	Bonnet (see instance 586)
2230	Heat_exchanger_component (see instance 604)	Bundle (see instance 588)
2231	Heat_exchanger_component (see instance 604)	Tube_sheet (see instance 622)
2232	Heat_transfer_equipment (see instance 560)	Double_pipe_heat_exchanger (see instance 547)
2233	Heat_transfer_equipment (see instance 560)	Fin_tube_air_preheater (see instance 548)
2234	Heat_transfer_equipment (see instance 560)	Fin_tube_heat_exchanger (see instance 549)
2235	Heat_transfer_equipment (see instance 560)	Flame_pipe_boiler (see instance 551)
2236	Heat_transfer_equipment (see instance 560)	Forced_draught_air_cooler (see instance 554)
2237	Heat_transfer_equipment (see instance 560)	Forced_draught_furnace (see instance 555)
2238	Heat_transfer_equipment (see instance 560)	Graphite_heat_exchanger (see instance 558)
2239	Heat_transfer_equipment (see instance 560)	Horizontal_furnace (see instance 561)
2240	Heat_transfer_equipment (see instance 560)	Horizontal_heat_transfer_equipment (see instance 562)
2241	Heat_transfer_equipment (see instance 560)	Induced_draught_air_cooler (see instance 563)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2242	Heat_transfer_equipment (see instance 560)	Induced_draught_furnace (see instance 564)
2243	Heat_transfer_equipment (see instance 560)	Natural_draught_air_cooler (see instance 566)
2244	Heat_transfer_equipment (see instance 560)	Natural_draught_furnace (see instance 567)
2245	Heat_transfer_equipment (see instance 560)	Plate_heat_exchanger (see instance 573)
2246	Heat_transfer_equipment (see instance 560)	Plate_type_air_preheater (see instance 574)
2247	Heat_transfer_equipment (see instance 560)	Shell_and_tube_heat_exchanger (see instance 577)
2248	Heat_transfer_equipment (see instance 560)	Surface_condenser (see instance 578)
2249	Heat_transfer_equipment (see instance 560)	Vertical_furnace (see instance 580)
2250	Heat_transfer_equipment (see instance 560)	Vertical_heat_transfer_equipment (see instance 581)
2251	Heat_transfer_equipment (see instance 560)	Water_pipe_boiler (see instance 583)
2252	Horizontal_heat_transfer_equipment (see instance 562)	Kettle_reboiler (see instance 565)
2253	Horizontal_vessel (see instance 1094)	Horizontal_vessel_with_boot (see instance 1095)
2254	Horizontal_vessel (see instance 1094)	Horizontal_vessel_with_dome (see instance 1096)
2255	Hub (see instance 909)	Impeller_hub (see instance 916)
2256	Hydrocarbon (see instance 1370)	Alkylate (see instance 1294)
2257	Hydrocarbon (see instance 1370)	Asphaltene (see instance 1298)
2258	Hydrocarbon (see instance 1370)	Bitumen (see instance 1308)
2259	Hydrocarbon (see instance 1370)	Butane (see instance 1317)
2260	Hydrocarbon (see instance 1370)	Decane (see instance 1337)
2261	Hydrocarbon (see instance 1370)	Ethane (see instance 1346)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2262	Hydrocarbon (see instance 1370)	Heptane (see instance 1365)
2263	Hydrocarbon (see instance 1370)	Hexane (see instance 1367)
2264	Hydrocarbon (see instance 1370)	Hydrocarbon_condensate (see instance 1371)
2265	Hydrocarbon (see instance 1370)	Liquefied_petroleum_gas (see instance 1390)
2266	Hydrocarbon (see instance 1370)	Long_residue (see instance 1391)
2267	Hydrocarbon (see instance 1370)	Methane (see instance 1397)
2268	Hydrocarbon (see instance 1370)	Natural_gas_liquid (see instance 1408)
2269	Hydrocarbon (see instance 1370)	Nonane (see instance 1416)
2270	Hydrocarbon (see instance 1370)	Octane (see instance 1419)
2271	Hydrocarbon (see instance 1370)	Oil (see instance 1420)
2272	Hydrocarbon (see instance 1370)	Pentane (see instance 1428)
2273	Hydrocarbon (see instance 1370)	Platformate (see instance 1435)
2274	Hydrocarbon (see instance 1370)	Propane (see instance 1442)
2275	Hydrocarbon (see instance 1370)	Refinery_fuel (see instance 1447)
2276	Hydrocarbon (see instance 1370)	Refinery_gas (see instance 1448)
2277	Hydrocarbon (see instance 1370)	Short_residue (see instance 1455)
2278	Hydrocarbon (see instance 1370)	Wax (see instance 1489)
2279	Impeller (see instance 911)	Anchor_type_impeller (see instance 836)
2280	Impeller (see instance 911)	Auxiliary_impeller (see instance 840)
2281	Impeller (see instance 911)	Axial_flow_impeller (see instance 842)
2282	Impeller (see instance 911)	Compressor_impeller (see instance 875)
2283	Impeller (see instance 911)	Expander_impeller (see instance 895)
2284	Impeller (see instance 911)	Mixer_impeller (see instance 944)
2285	Impeller (see instance 911)	Pump_impeller (see instance 958)
2286	Impeller (see instance 911)	Screw_impeller (see instance 970)
2287	Impeller_hub (see instance 916)	Impeller_shroud (see instance 919)
2288	Impulse_compressor (see instance 797)	Axial_compressor (see instance 761)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2289	Impulse_compressor (see instance 797)	Blower (see instance 767)
2290	Impulse_compressor (see instance 797)	Centrifugal_compressor (see instance 773)
2291	Impulse_pump (see instance 798)	Centrifugal_pump (see instance 774)
2292	Impulse_pump (see instance 798)	Propeller_pump (see instance 811)
2293	In_line_measuring_device (see instance 631)	Coriolis_meter (see instance 629)
2294	In_line_measuring_device (see instance 631)	Magnetic_flow_meter (see instance 634)
2295	In_line_measuring_device (see instance 631)	Turbine_meter (see instance 646)
2296	In_line_measuring_device (see instance 631)	Ultrasonic_flow_meter (see instance 650)
2297	In_line_measuring_device (see instance 631)	Vortex_meter (see instance 652)
2298	Inert_material (see instance 1376)	Filler (see instance 1349)
2299	Inorganic_chemical (see instance 1378)	Carbon_dioxide (see instance 1322)
2300	Inorganic_chemical (see instance 1378)	Hydrogen (see instance 1372)
2301	Inorganic_chemical (see instance 1378)	Hydrogen_sulphide (see instance 1373)
2302	Inorganic_chemical (see instance 1378)	Nitrogen (see instance 1411)
2303	Inorganic_chemical (see instance 1378)	Nitrogen_oxide (see instance 1413)
2304	Inorganic_chemical (see instance 1378)	Oxygen (see instance 1422)
2305	Inorganic_chemical (see instance 1378)	Silicon_oxide (see instance 1456)
2306	Inorganic_chemical (see instance 1378)	Sulphur (see instance 1474)
2307	Inorganic_chemical (see instance 1378)	Sulphur_dioxide (see instance 1475)
2308	Inorganic_chemical (see instance 1378)	Water (see instance 1488)
2309	Instrument_component (see instance 660)	In_line_element (see instance 659)
2310	Instrument_component (see instance 660)	Paper_drive (see instance 662)
2311	Instrument_component (see instance 660)	Pneumatic_component (see instance 663)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2312	Instrument_component (see instance 660)	Wetted_part (see instance 672)
2313	Instrument_nozzle (see instance 1097)	Level_gauge_nozzle (see instance 1099)
2314	Insulation_support (see instance 1156)	Insulation_collar (see instance 1155)
2315	Insulation_support (see instance 1156)	Insulation_support_ring (see instance 1158)
2316	Intermediate_shaft (see instance 927)	Idler_shaft (see instance 910)
2317	Internal_combustion_engine (see instance 800)	Diesel_engine (see instance 781)
2318	Internal_combustion_engine (see instance 800)	Gas_engine (see instance 791)
2319	Internal_combustion_engine (see instance 800)	Petrol_engine (see instance 806)
2320	Kerosene (see instance 1384)	Lamp_oil (see instance 1385)
2321	Lift_check_valve (see instance 1039)	Ball_check_valve (see instance 1014)
2322	Liquid (see instance 1283)	Electrical_insulation_liquid (see instance 1341)
2323	Liquid (see instance 1283)	Liquid_waste (see instance 1388)
2324	Liquid (see instance 1283)	Liquefied_natural_gas (see instance 1389)
2325	Liquid (see instance 1283)	Liquefied_petroleum_gas (see instance 1390)
2326	Liquid (see instance 1283)	Natural_gas_liquid (see instance 1408)
2327	Liquid (see instance 1283)	Oil (see instance 1420)
2328	Liquefied_petroleum_gas (see instance 1390)	Bottled_gas (see instance 1314)
2329	Lubricant (see instance 1392)	Grease (see instance 1363)
2330	Lubricant (see instance 1392)	Lubricating_oil (see instance 1393)
2331	Lubricating_oil (see instance 1393)	Black_oil (see instance 1310)
2332	Lubricating_oil (see instance 1393)	Cutting_oil (see instance 1333)
2333	Lubricating_oil (see instance 1393)	Cylinder_oil (see instance 1334)
2334	Lubricating_oil (see instance 1393)	Detergent_oil (see instance 1338)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2335	Lubricating_oil (see instance 1393)	Engine_oil (see instance 1345)
2336	Lubricating_oil (see instance 1393)	Insulating_oil (see instance 1380)
2337	Lubricating_oil (see instance 1393)	Machine_oil (see instance 1396)
2338	Lubricating_oil (see instance 1393)	Spindle_oil (see instance 1466)
2339	Lubricating_oil (see instance 1393)	Steam_turbine_oil (see instance 1469)
2340	Lubricating_oil (see instance 1393)	White_oil (see instance 1491)
2341	Lubrication_ring (see instance 937)	Bearing_lubrication_ring (see instance 862)
2342	Manhole (see instance 1167)	Manhole_with_jacket (see instance 1168)
2343	Manometer (see instance 635)	U-tube_manometer (see instance 647)
2344	Material_assembly (see instance 544)	Air_set (see instance 625)
2345	Material_assembly (see instance 544)	Belt_drive (see instance 863)
2346	Material_assembly (see instance 544)	Connection_packing_assembly (see instance 591)
2347	Material_assembly (see instance 544)	Orifice_assembly (see instance 636)
2348	Material_assembly (see instance 544)	Piping_assembly (see instance 716)
2349	Material_catalogue (see instance 545)	Piping_specification (see instance 718)
2350	Material_collection (see instance 546)	Bill_of_materials (see instance 541)
2351	Material_collection (see instance 546)	Material_catalogue (see instance 545)
2352	Material_collection (see instance 546)	Piping (see instance 715)
2353	Material_collection (see instance 546)	Wet_bolting (see instance 1010)
2354	Measuring_or_sensing_element (see instance 661)	Flow_measuring_element (see instance 656)
2355	Measuring_or_sensing_element (see instance 661)	Pressure_sensing_element (see instance 664)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2356	Measuring_or_sensing_element (see instance 661)	Temperature_sensing_element (see instance 669)
2357	Mechanical_contact_seal (see instance 941)	Iso_carbon_seal (see instance 931)
2358	Mechanical_equipment (see instance 754)	Heat_transfer_equipment (see instance 560)
2359	Mechanical_seal (see instance 942)	Cartridge_mechanical_seal (see instance 866)
2360	Mechanical_seal (see instance 942)	Double_mechanical_seal (see instance 887)
2361	Mechanical_seal (see instance 942)	Dry_running_seal (see instance 893)
2362	Mechanical_seal (see instance 942)	Metal_bellow_seal (see instance 943)
2363	Mechanical_seal (see instance 942)	Pusher_type_seal (see instance 959)
2364	Mechanical_seal (see instance 942)	Single_mechanical_seal (see instance 982)
2365	Mechanical_seal (see instance 942)	Tandem_mechanical_seal (see instance 997)
2366	Mechanical_seal (see instance 942)	Triple_mechanical_seal (see instance 1007)
2367	Mineral_oil (see instance 1400)	Crude_oil (see instance 1331)
2368	Mineral_oil (see instance 1400)	Shale_oil (see instance 1454)
2369	Mineral_oil (see instance 1400)	Textile_oil (see instance 1479)
2370	Mineral_wax (see instance 1401)	Ozokerite (see instance 1423)
2371	Mixer_impeller (see instance 944)	Axial_flow_mixer_impeller (see instance 843)
2372	Mixer_impeller (see instance 944)	Bar_turbine_impeller (see instance 851)
2373	Mixer_impeller (see instance 944)	Double_spiral_mixer_impeller (see instance 888)
2374	Mixer_impeller (see instance 944)	Flat_blade_impeller (see instance 897)
2375	Mixer_impeller (see instance 944)	Marine_type_impeller (see instance 940)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2376	Mixture (see instance 1402)	Air (see instance 1293)
2377	Mixture (see instance 1402)	Asphalt (see instance 1297)
2378	Mixture (see instance 1402)	Fraction (see instance 1356)
2379	Mixture (see instance 1402)	Heterogeneous_mixture (see instance 1366)
2380	Mixture (see instance 1402)	Homogeneous_mixture (see instance 1368)
2381	Mixture (see instance 1402)	Liquid_solid (see instance 1284)
2382	Mixture (see instance 1402)	Vapour_liquid (see instance 1288)
2383	Mixture (see instance 1402)	Vapour_liquid_solid (see instance 1289)
2384	Mixture (see instance 1402)	Vapour_solid (see instance 1290)
2385	Natural_gas (see instance 1407)	Liquefied_natural_gas (see instance 1389)
2386	Nipple (see instance 568)	Grease_nipple (see instance 906)
2387	Nipple (see instance 568)	Spray_nipple (see instance 736)
2388	Nitrogen_oxide (see instance 1413)	Nitrogen_dioxide (see instance 1412)
2389	Nitrogen_oxide (see instance 1413)	Nitrogen_trioxide (see instance 1414)
2390	Non_manual_actuator (see instance 1075)	Electrical_actuator (see instance 1069)
2391	Non_manual_actuator (see instance 1075)	Hydraulic_actuator (see instance 1071)
2392	Non_manual_actuator (see instance 1075)	Pneumatic_actuator (see instance 1076)
2393	Non_manual_actuator (see instance 1075)	Spring_controlled_actuator (see instance 1078)
2394	Nozzle (see instance 569)	Flanged_nozzle (see instance 1091)
2395	Nozzle (see instance 569)	Handhole (see instance 1151)
2396	Nozzle (see instance 569)	Instrument_nozzle (see instance 1097)
2397	Nozzle (see instance 569)	Integrally_reinforced_nozzle (see instance 1098)
2398	Nozzle (see instance 569)	Manhole (see instance 1167)
2399	Nozzle (see instance 569)	Nipple (see instance 568)
2400	Nozzle (see instance 569)	Stationary_head_nozzle (see instance 617)
2401	Nozzle (see instance 569)	Welded_nozzle (see instance 1115)
2402	Nut (see instance 1171)	Bearing_locknut (see instance 861)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2403	Nut (see instance 1171)	Casing_nut (see instance 869)
2404	Nut (see instance 1171)	Impeller_nut (see instance 918)
2405	O_ring (see instance 951)	Seat_gasket (see instance 976)
2406	Oil (see instance 1420)	Base_oil (see instance 1304)
2407	Oil (see instance 1420)	Benzole_wash_oil (see instance 1306)
2408	Oil (see instance 1420)	Blown_oil (see instance 1313)
2409	Oil (see instance 1420)	Cable_compound (see instance 1319)
2410	Oil (see instance 1420)	Flux_oil (see instance 1354)
2411	Oil (see instance 1420)	Fuel_oil (see instance 1358)
2412	Oil (see instance 1420)	Hot_oil (see instance 1369)
2413	Oil (see instance 1420)	Liquid_paraffin (see instance 1387)
2414	Oil (see instance 1420)	Lubricating_oil (see instance 1393)
2415	Oil (see instance 1420)	Mineral_oil (see instance 1400)
2416	Oil (see instance 1420)	Preservative_oil (see instance 1438)
2417	Oil (see instance 1420)	Soluble_oil (see instance 1461)
2418	Oil (see instance 1420)	Used_oil (see instance 1484)
2419	Olet (see instance 706)	Elbowlet (see instance 692)
2420	Orifice_assembly (see instance 636)	Orifice_flow_meter (see instance 637)
2421	Packing (see instance 980)	Collar_packing (see instance 874)
2422	Parallel_gate_valve (see instance 1044)	Conduit_gate_valve (see instance 1021)
2423	Parallel_gate_valve (see instance 1044)	Slide_valve (see instance 1054)
2424	Pentane (see instance 1428)	Iso-pentane (see instance 1382)
2425	Pentane (see instance 1428)	Normal_pentane (see instance 1418)
2426	Petroleum_distillate (see instance 1430)	Atmospheric_distillate (see instance 1302)
2427	Petroleum_distillate (see instance 1430)	Black_product (see instance 1311)
2428	Petroleum_distillate (see instance 1430)	Gasoil (see instance 1360)
2429	Petroleum_distillate (see instance 1430)	Gasoline (see instance 1361)
2430	Petroleum_distillate (see instance 1430)	Heavy_distillate (see instance 1364)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2431	Petroleum_distillate (see instance 1430)	Light_distillate (see instance 1386)
2432	Petroleum_distillate (see instance 1430)	Lubricating_oil_distillate (see instance 1395)
2433	Petroleum_distillate (see instance 1430)	Middle_distillate (see instance 1399)
2434	Petroleum_distillate (see instance 1430)	Naphtha (see instance 1404)
2435	Petroleum_distillate (see instance 1430)	Special_boiling_point_spirit (see instance 1465)
2436	Petroleum_distillate (see instance 1430)	Straight_run_product (see instance 1471)
2437	Petroleum_distillate (see instance 1430)	Unrefined_distillate (see instance 1482)
2438	Petroleum_distillate (see instance 1430)	Vacuum_distillate (see instance 1486)
2439	Petroleum_distillate (see instance 1430)	Waxy_distillate (see instance 1490)
2440	Petroleum_distillate (see instance 1430)	White_product (see instance 1492)
2441	Physical_information_carrier (see 4.2.124)	Document (see instance 1213)
2442	Pipe (see instance 707)	Bent_pipe (see instance 676)
2443	Pipe (see instance 707)	Capillary_tube (see instance 681)
2444	Pipe (see instance 707)	Flexible_hose (see instance 694)
2445	Pipe (see instance 707)	Pipe_bend (see instance 708)
2446	Pipe (see instance 707)	Stand_pipe (see instance 737)
2447	Pipe (see instance 707)	Straight_pipe (see instance 738)
2448	Pipe (see instance 707)	Tube (see instance 621)
2449	Pipe_bend (see instance 708)	Mitre_bend (see instance 703)
2450	Pipe_fitting (see instance 711)	Cross_pipe_junction (see instance 685)
2451	Pipe_fitting (see instance 711)	Elbow (see instance 691)
2452	Pipe_fitting (see instance 711)	Lateral_pipe_junction (see instance 699)
2453	Pipe_fitting (see instance 711)	Olet (see instance 706)
2454	Pipe_fitting (see instance 711)	Pipe_coupling (see instance 709)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2455	Pipe_fitting (see instance 711)	Plug (see instance 721)
2456	Pipe_fitting (see instance 711)	Reducer (see instance 724)
2457	Pipe_fitting (see instance 711)	Socket (see instance 731)
2458	Pipe_fitting (see instance 711)	Stub (see instance 739)
2459	Pipe_fitting (see instance 711)	Swage_nipple (see instance 740)
2460	Pipe_fitting (see instance 711)	Tee (see instance 741)
2461	Pipe_fitting (see instance 711)	Union (see instance 745)
2462	Pipe_flange (see instance 710)	Blind_flange (see instance 677)
2463	Pipe_flange (see instance 710)	Butt_weld_flange (see instance 679)
2464	Pipe_flange (see instance 710)	Delta_ring_flange (see instance 686)
2465	Pipe_flange (see instance 710)	Flat_face_flange (see instance 693)
2466	Pipe_flange (see instance 710)	Hub_flange (see instance 695)
2467	Pipe_flange (see instance 710)	Lap_joint_flange (see instance 696)
2468	Pipe_flange (see instance 710)	Lapped_flange (see instance 698)
2469	Pipe_flange (see instance 710)	Lens_ring_flange (see instance 700)
2470	Pipe_flange (see instance 710)	Male_female_flange (see instance 701)
2471	Pipe_flange (see instance 710)	O_ring_flange (see instance 705)
2472	Pipe_flange (see instance 710)	Raised_face_flange (see instance 723)
2473	Pipe_flange (see instance 710)	Ring_joint_gasket_flange (see instance 725)
2474	Pipe_flange (see instance 710)	Slip_on_flange (see instance 730)
2475	Pipe_flange (see instance 710)	Socket_weld_flange (see instance 732)
2476	Pipe_flange (see instance 710)	Spacer_and_blind (see instance 733)
2477	Pipe_flange (see instance 710)	Spectacle_blind (see instance 734)
2478	Pipe_flange (see instance 710)	Threaded_flange (see instance 742)
2479	Pipe_flange (see instance 710)	Tongue_and_groove_flange (see instance 743)
2480	Pipe_flange (see instance 710)	Weld_neck_flange (see instance 747)
2481	Piping_assembly (see instance 716)	Drain_assembly (see instance 687)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2482	Piping_assembly (see instance 716)	Lap_joint_flange_connection (see instance 697)
2483	Piping_assembly (see instance 716)	Piping_spool (see instance 719)
2484	Piping_component (see instance 717)	Basket_filter (see instance 674)
2485	Piping_component (see instance 717)	Bellow (see instance 675)
2486	Piping_component (see instance 717)	Cartridge_filter (see instance 682)
2487	Piping_component (see instance 717)	Drain_funnel (see instance 688)
2488	Piping_component (see instance 717)	Duplex_filter (see instance 689)
2489	Piping_component (see instance 717)	Mechanical_steam_trap (see instance 702)
2490	Piping_component (see instance 717)	Pipe (see instance 707)
2491	Piping_component (see instance 717)	Pipe_fitting (see instance 711)
2492	Piping_component (see instance 717)	Pipe_flange (see instance 710)
2493	Piping_component (see instance 717)	Pipe_neck (see instance 712)
2494	Piping_component (see instance 717)	Pipe_support (see instance 713)
2495	Piping_component (see instance 717)	Piping_terminator (see instance 720)
2496	Piping_component (see instance 717)	Rotary_belt_filter (see instance 726)
2497	Piping_component (see instance 717)	Rotary_drum_filter (see instance 727)
2498	Piping_component (see instance 717)	Screen (see instance 728)
2499	Piping_component (see instance 717)	U_trap (see instance 744)
2500	Piping_component (see instance 717)	Valve (see instance 1063)
2501	Piping_component (see instance 717)	Vertical_leaf_Niagara_filter (see instance 746)
2502	Piping_component (see instance 717)	Y_type_strainer (see instance 748)
2503	Piping_spool (see instance 719)	Spool_piece (see instance 735)
2504	Piping_terminator (see instance 720)	Cap (see instance 680)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2505	Plate (see instance 610)	Corrugated_plate (see instance 592)
2506	Plate (see instance 610)	Flat_plate (see instance 599)
2507	Plate (see instance 610)	Impingement_plate (see instance 606)
2508	Plate (see instance 610)	Orifice_plate (see instance 638)
2509	Plate (see instance 610)	Pass_partition_plate (see instance 609)
2510	Plate (see instance 610)	Support_plate (see instance 619)
2511	Plate_heat_exchanger (see instance 573)	Plate_and_frame_heat_exchanger (see instance 570)
2512	Plate_heat_exchanger (see instance 573)	Plate_and_shell_heat_exchanger (see instance 571)
2513	Plate_heat_exchanger (see instance 573)	Plate_fin_heat_exchanger (see instance 572)
2514	Plug_valve (see instance 1050)	Parallel_plug_valve (see instance 1045)
2515	Positive_displacement_compressor (see instance 809)	Reciprocating_compressor (see instance 813)
2516	Positive_displacement_compressor (see instance 809)	Rotating_positive_displacement_compressor (see instance 819)
2517	Positive_displacement_pump (see instance 810)	Reciprocating_positive_displacement_pump (see instance 815)
2518	Positive_displacement_pump (see instance 810)	Rotating_positive_displacement_pump (see instance 821)
2519	Pressure_relief_valve (see instance 458)	Spring_loaded_pressure_relief_valve (see instance 1059)
2520	Probe (see instance 665)	Sample_probe (see instance 667)
2521	Propane (see instance 1442)	Commercial_propane (see instance 1328)
2522	Protection_material (see instance 722)	Cladding (see instance 1131)
2523	Protection_material (see instance 722)	Coating (see instance 683)
2524	Pump_equipment (see instance 812)	Archimedian_screw_pump (see instance 760)
2525	Pump_equipment (see instance 812)	Close_coupled_pump (see instance 775)
2526	Pump_equipment (see instance 812)	Drawn_fluid_pump (see instance 783)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2527	Pump_equipment (see instance 812)	Gas_lift_pump (see instance 792)
2528	Pump_equipment (see instance 812)	Impulse_pump (see instance 798)
2529	Pump_equipment (see instance 812)	Positive_displacement_pump (see instance 810)
2530	Radial_bearing (see instance 960)	Driven_end_radial_bearing (see instance 890)
2531	Radial_bearing (see instance 960)	Non_driven_end_radial_bearing (see instance 947)
2532	Reciprocating_compressor (see instance 813)	Diaphragm_compressor (see instance 779)
2533	Reciprocating_compressor (see instance 813)	Reciprocating_piston_compressor (see instance 814)
2534	Reciprocating_positive_displacement_pump (see instance 815)	Plunger_pump (see instance 808)
2535	Reciprocating_positive_displacement_pump (see instance 815)	Piston_pump (see instance 807)
2536	Reciprocating_positive_displacement_pump (see instance 815)	Diaphragm_pump (see instance 780)
2537	Reciprocating_positive_displacement_pump (see instance 815)	Bellow_pump (see instance 766)
2538	Reducer (see instance 724)	Concentric_reducer (see instance 684)
2539	Reducer (see instance 724)	Eccentric_reducer (see instance 690)
2540	Refractory_lined_vessel (see instance 1105)	Refractory_lined_cyclone (see instance 1102)
2541	Refractory_lined_vessel (see instance 1105)	Refractory_lined_reactor (see instance 1104)
2542	Refractory_lined_vessel (see instance 1105)	Refractory_lined_separator (see instance 1103)
2543	Refractory_lining (see instance 1177)	Concrete_insulation (see instance 590)
2544	Ring (see instance 611)	Backing_ring (see instance 1118)
2545	Ring (see instance 611)	Lubrication_ring (see instance 937)
2546	Rock (see instance 1450)	Rock_asphalt (see instance 1451)
2547	Roof (see instance 1179)	Conical_roof (see instance 1135)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2548	Roof (see instance 1179)	Dome_roof (see instance 1144)
2549	Rotary_valve (see instance 1052)	Plug_valve (see instance 1050)
2550	Rotating_positive_displacement_compressor (see instance 819)	Liquid_ring_compressor (see instance 801)
2551	Rotating_equipment (see instance 820)	Aero_derivative_gas_turbine (see instance 758)
2552	Rotating_equipment (see instance 820)	Archimedian_screw_pump (see instance 760)
2553	Rotating_equipment (see instance 820)	Axial_turbine_mixer (see instance 763)
2554	Rotating_equipment (see instance 820)	Back_pressure_steam_turbine (see instance 764)
2555	Rotating_equipment (see instance 820)	Bottom_entry_mixer (see instance 768)
2556	Rotating_equipment (see instance 820)	Bowl_centrifuge (see instance 769)
2557	Rotating_equipment (see instance 820)	Close_coupled_pump (see instance 775)
2558	Rotating_equipment (see instance 820)	Drawn_fluid_pump (see instance 783)
2559	Rotating_equipment (see instance 820)	Driven_equipment (see instance 784)
2560	Rotating_equipment (see instance 820)	Horizontal_electric_motor (see instance 796)
2561	Rotating_equipment (see instance 820)	Impulse_compressor (see instance 797)
2562	Rotating_equipment (see instance 820)	Impulse_pump (see instance 798)
2563	Rotating_equipment (see instance 820)	Industrial_gas_turbine (see instance 799)
2564	Rotating_equipment (see instance 820)	Internal_combustion_engine (see instance 800)
2565	Rotating_equipment (see instance 820)	Positive_displacement_compressor (see instance 809)
2566	Rotating_equipment (see instance 820)	Positive_displacement_pump (see instance 810)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2567	Rotating_equipment (see instance 820)	Side_entry_mixer (see instance 824)
2568	Rotating_equipment (see instance 820)	Top_entry_mixer (see instance 1005)
2569	Rotating_equipment_component (see instance 966)	Balance_counter_disc (see instance 844)
2570	Rotating_equipment_component (see instance 966)	Balance_disc_sheet (see instance 846)
2571	Rotating_equipment_component (see instance 966)	Balance_drum (see instance 847)
2572	Rotating_equipment_component (see instance 966)	Balance_liner (see instance 849)
2573	Rotating_equipment_component (see instance 966)	Balancing_chamber (see instance 850)
2574	Rotating_equipment_component (see instance 966)	Bearing_bushing (see instance 857)
2575	Rotating_equipment_component (see instance 966)	Bearing_housing (see instance 860)
2576	Rotating_equipment_component (see instance 966)	Centering_ring (see instance 872)
2577	Rotating_equipment_component (see instance 966)	Coupling_guard (see instance 878)
2578	Rotating_equipment_component (see instance 966)	Diffuser (see instance 883)
2579	Rotating_equipment_component (see instance 966)	Fluid_coupling (see instance 899)
2580	Rotating_equipment_component (see instance 966)	Gear (see instance 902)
2581	Rotating_equipment_component (see instance 966)	Gear_box (see instance 903)
2582	Rotating_equipment_component (see instance 966)	Hub (see instance 909)
2583	Rotating_equipment_component (see instance 966)	Impeller (see instance 911)
2584	Rotating_equipment_component (see instance 966)	Impeller_assembly (see instance 912)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2585	Rotating_equipment_component (see instance 966)	Intermediate_impeller_bearing_spider (see instance 926)
2586	Rotating_equipment_component (see instance 966)	Internal_rotor (see instance 928)
2587	Rotating_equipment_component (see instance 966)	Piston (see instance 955)
2588	Rotating_equipment_component (see instance 966)	Rotating_face (see instance 967)
2589	Rotating_equipment_component (see instance 966)	Rotor (see instance 968)
2590	Rotating_equipment_component (see instance 966)	Shaft_key (see instance 979)
2591	Rotating_equipment_component (see instance 966)	Thrust_balance_assembly (see instance 1000)
2592	Rotating_equipment_component (see instance 966)	Wear_ring (see instance 1009)
2593	Rotating_positive_displacement_compressor (see instance 819)	Screw_compressor (see instance 822)
2594	Rotating_positive_displacement_pump (see instance 821)	Vane_pump (see instance 829)
2595	Rotating_positive_displacement_pump (see instance 821)	Screw_pump (see instance 823)
2596	Rotating_positive_displacement_pump (see instance 821)	Rotary_plunger_pump (see instance 818)
2597	Rotating_positive_displacement_pump (see instance 821)	Rotary_piston_pump (see instance 817)
2598	Rotating_positive_displacement_pump (see instance 821)	Lobe_pump (see instance 802)
2599	Rotating_positive_displacement_pump (see instance 821)	Gear_pump (see instance 793)
2600	Rotating_positive_displacement_pump (see instance 821)	Flexible_wall_pump (see instance 790)
2601	Rotating_positive_displacement_pump (see instance 821)	Flexible_hose_pump (see instance 789)
2602	Rotating_positive_displacement_pump (see instance 821)	Disc_rotor_pump (see instance 782)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2603	Rotating_positive_displacement_pump (see instance 821)	Bucket_pump (see instance 770)
2604	Sand (see instance 1452)	Asphaltic_sand (see instance 1300)
2605	Screw (see instance 969)	Set_screw (see instance 977)
2606	Seal (see instance 971)	Compressor_or_expander_seal (see instance 876)
2607	Seal (see instance 971)	Deepwell_pump_liquid_seal (see instance 881)
2608	Seal (see instance 971)	Ferrel_tube_connector (see instance 596)
2609	Seal (see instance 971)	Labyrinth_seal (see instance 933)
2610	Seal (see instance 971)	Liquid_seal (see instance 935)
2611	Seal (see instance 971)	Mechanical_seal (see instance 942)
2612	Seal (see instance 971)	Seal_bellow (see instance 972)
2613	Shaft (see instance 978)	High_speed_shaft (see instance 907)
2614	Shaft (see instance 978)	Intermediate_shaft (see instance 927)
2615	Shaft (see instance 978)	Low_speed_shaft (see instance 936)
2616	Shaft (see instance 978)	Top_pump_shaft (see instance 1006)
2617	Shaft_key (see instance 979)	Impeller_key (see instance 917)
2618	Shaft_sleeve (see instance 981)	Interstage_shaft_sleeve (see instance 930)
2619	Shell (see instance 1181)	Heat_exchanger_shell (see instance 605)
2620	Shell_and_tube_heat_exchanger (see instance 577)	Fixed_tube_sheet_heat_exchanger (see instance 550)
2621	Shell_and_tube_heat_exchanger (see instance 577)	Floating_head_heat_exchanger (see instance 552)
2622	Shell_and_tube_heat_exchanger (see instance 577)	Hairpin_heat_exchanger (see instance 559)
2623	Shell_and_tube_heat_exchanger (see instance 577)	Shell_and_tube_condenser (see instance 575)
2624	Shell_and_tube_heat_exchanger (see instance 577)	Shell_and_tube_cooler (see instance 576)
2625	Silicon_oxide (see instance 1456)	Rock (see instance 1450)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2626	Silicon_oxide (see instance 1456)	Sand (see instance 1452)
2627	Sleeve (see instance 983)	Bush (see instance 864)
2628	Sleeve (see instance 983)	Shaft_sleeve (see instance 981)
2629	Soil (see instance 1459)	Contaminated_soil (see instance 1330)
2630	Solid (see instance 1286)	Construction_material (see instance 1329)
2631	Solid (see instance 1286)	Ice (see instance 1374)
2632	Solid (see instance 1286)	Solid_waste (see instance 1460)
2633	Solvent (see instance 1462)	White_spirit (see instance 1493)
2634	Special_boiling_point_spirit (see instance 1465)	Petroleum_ether (see instance 1434)
2635	Steam (see instance 1468)	Saturated_steam (see instance 1453)
2636	Steam (see instance 1468)	Superheated_steam (see instance 1476)
2637	Steam_turbine (see instance 432)	Air_cooled_steam_turbine (see instance 759)
2638	Steam_turbine (see instance 432)	Condensing_steam_turbine (see instance 778)
2639	Stud (see instance 1188)	Casing_stud (see instance 870)
2640	Substance (see instance 1473)	Acid (see instance 1291)
2641	Substance (see instance 1473)	Additive (see instance 1292)
2642	Substance (see instance 1473)	Batch (see instance 1305)
2643	Substance (see instance 1473)	Binder (see instance 1307)
2644	Substance (see instance 1473)	Carbon (see instance 1320)
2645	Substance (see instance 1473)	Catalyst (see instance 1323)
2646	Substance (see instance 1473)	Coal (see instance 1326)
2647	Substance (see instance 1473)	Distillation_component (see instance 1339)
2648	Substance (see instance 1473)	Emulsion (see instance 1344)
2649	Substance (see instance 1473)	Extract (see instance 1348)
2650	Substance (see instance 1473)	Filter_cake (see instance 1350)
2651	Substance (see instance 1473)	Fluid (see instance 1353)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2652	Substance (see instance 1473)	Fuel (see instance 1357)
2653	Substance (see instance 1473)	Hydrocarbon (see instance 1370)
2654	Substance (see instance 1473)	Inert_material (see instance 1376)
2655	Substance (see instance 1473)	Inorganic_chemical (see instance 1378)
2656	Substance (see instance 1473)	Lubricant (see instance 1392)
2657	Substance (see instance 1473)	Lubricating_oil_component (see instance 1394)
2658	Substance (see instance 1473)	Mixture (see instance 1402)
2659	Substance (see instance 1473)	Paint (see instance 1424)
2660	Substance (see instance 1473)	Petrochemical_feedstock (see instance 1429)
2661	Substance (see instance 1473)	Petroleum_flux (see instance 1431)
2662	Substance (see instance 1473)	Pool (see instance 1436)
2663	Substance (see instance 1473)	Process_material (see instance 1440)
2664	Substance (see instance 1473)	Sludge (see instance 1458)
2665	Substance (see instance 1473)	Soil (see instance 1459)
2666	Substance (see instance 1473)	Solvent (see instance 1462)
2667	Substance (see instance 1473)	Solvent_component (see instance 1463)
2668	Substance (see instance 1473)	Stream (see instance 1472)
2669	Substance (see instance 1473)	Utility_substance (see instance 1485)
2670	Substance (see instance 1473)	Waste (see instance 1487)
2671	Support (see instance 1189)	Bracket (see instance 587)
2672	Support (see instance 1189)	Drive_stool (see instance 889)
2673	Support (see instance 1189)	Insulation_support (see instance 1156)
2674	Support (see instance 1189)	Leg (see instance 1161)
2675	Support (see instance 1189)	Saddle (see instance 1180)
2676	Support (see instance 1189)	Vessel_skirt (see instance 1205)
2677	Support_tray (see instance 1190)	Grid_tray (see instance 1150)
2678	Swing_check_valve (see instance 1061)	Flap_valve (see instance 1028)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2679	Tank (see instance 1108)	Atmospheric_storage_tank (see instance 1083)
2680	Tank (see instance 1108)	Conical_bottom_tank (see instance 1086)
2681	Tank (see instance 1108)	Conical_roof_tank (see instance 1087)
2682	Tank (see instance 1108)	Dome_roof_tank (see instance 1089)
2683	Tank (see instance 1108)	Floating_roof_tank (see instance 1092)
2684	Tank (see instance 1108)	Open_tank (see instance 1100)
2685	Temperature_sensing_element (see instance 669)	Temperature_measuring_element (see instance 668)
2686	Thrust_balance_assembly (see instance 1000)	Balance_disc_assembly (see instance 845)
2687	Thrust_balance_assembly (see instance 1000)	Balance_drum_assembly (see instance 848)
2688	Thrust_bearing (see instance 1001)	Driven_end_thrust_bearing (see instance 891)
2689	Thrust_bearing (see instance 1001)	Non_driven_end_thrust_bearing (see instance 948)
2690	Thrust_bearing (see instance 1001)	Pivot_shoe_thrust_bearing (see instance 956)
2691	Tray (see instance 1194)	Baffle_tray (see instance 1119)
2692	Tray (see instance 1194)	Bubble_cap_tray (see instance 1127)
2693	Tray (see instance 1194)	Calming_section_tray (see instance 1128)
2694	Tray (see instance 1194)	Chimney_tray (see instance 1130)
2695	Tray (see instance 1194)	Conventional_downcomer_tray (see instance 1136)
2696	Tray (see instance 1194)	Demister_support_tray (see instance 1138)
2697	Tray (see instance 1194)	Disc_and_doughnut_tray (see instance 1140)
2698	Tray (see instance 1194)	Distributor_tray (see instance 1142)
2699	Tray (see instance 1194)	M_cap_tray (see instance 1164)
2700	Tray (see instance 1194)	Partial_draw_off_tray (see instance 1172)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2701	Tray (see instance 1194)	Sieve_tray (see instance 1183)
2702	Tray (see instance 1194)	Total_draw_off_tray (see instance 1193)
2703	Tray (see instance 1194)	V-grid_tray (see instance 1197)
2704	Tray (see instance 1194)	Valve_tray (see instance 1198)
2705	Tube (see instance 621)	Finned_tube (see instance 598)
2706	Tube_sheet (see instance 622)	Floating_tubesheet (see instance 601)
2707	Ultrasonic_meter (see instance 651)	Ultrasonic_flow_meter (see instance 650)
2708	Unrefined_distillate (see instance 1482)	Pressure_distillate (see instance 1439)
2709	Used_oil (see instance 1484)	Used_lubricant (see instance 1483)
2710	Valve (see instance 1063)	Balanced_safety_valve (see instance 1013)
2711	Valve (see instance 1063)	Ball_valve (see instance 1015)
2712	Valve (see instance 1063)	Barstock_valve (see instance 1017)
2713	Valve (see instance 1063)	Bursting_disc_relief_valve (see instance 1018)
2714	Valve (see instance 1063)	Butterfly_valve (see instance 1019)
2715	Valve (see instance 1063)	Conventional_relief_valve (see instance 1022)
2716	Valve (see instance 1063)	Diaphragm_valve (see instance 1023)
2717	Valve (see instance 1063)	Float_valve (see instance 1029)
2718	Valve (see instance 1063)	Gate_valve (see instance 1031)
2719	Valve (see instance 1063)	Globe_valve (see instance 1032)
2720	Valve (see instance 1063)	Hand_operated_valve (see instance 1033)
2721	Valve (see instance 1063)	Jacketted_valve (see instance 1037)
2722	Valve (see instance 1063)	Lift_check_valve (see instance 1039)
2723	Valve (see instance 1063)	Lock_up_valve (see instance 1040)
2724	Valve (see instance 1063)	Manual_control_valve (see instance 1041)
2725	Valve (see instance 1063)	Motor_operated_valve (see instance 1042)
2726	Valve (see instance 1063)	Pinch_valve (see instance 1048)
2727	Valve (see instance 1063)	Rotary_star_valve (see instance 1051)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2728	Valve (see instance 1063)	Rotary_valve (see instance 1052)
2729	Valve (see instance 1063)	Solenoid_valve (see instance 1056)
2730	Valve (see instance 1063)	Swing_check_valve (see instance 1061)
2731	Valve (see instance 1063)	Tank_valve (see instance 1062)
2732	Valve (see instance 1063)	Y_pattern_valve (see instance 1065)
2733	Valve_body (see instance 1080)	Angle_body (see instance 1067)
2734	Valve_body (see instance 1080)	In_line_body (see instance 658)
2735	Valve_component (see instance 1079)	Actuator (see instance 1066)
2736	Valve_component (see instance 1079)	Closure_member (see instance 1068)
2737	Valve_component (see instance 1079)	Positioner (see instance 1077)
2738	Valve_component (see instance 1079)	Valve_bonnet (see instance 1081)
2739	Valve_component (see instance 1079)	Valve_body (see instance 1080)
2740	Valve_component (see instance 1079)	Valve_gland (see instance 1082)
2741	Vane (see instance 1008)	Impeller_vane (see instance 920)
2742	Vapour (see instance 1287)	Gas (see instance 1359)
2743	Vapour (see instance 1287)	Steam (see instance 1468)
2744	Venturi (see instance 670)	Venturi_tube (see instance 671)
2745	Vertical_centrifugal_pump (see instance 831)	Vertical_turbine_pump (see instance 835)
2746	Vertical_heat_transfer_equipment (see instance 581)	Vertical_reboiler (see instance 582)
2747	Vertical_reboiler (see instance 582)	Thermosyphon_reboiler (see instance 579)
2748	Vertical_vessel (see instance 1112)	Column (see instance 1084)
2749	Vertical_vessel (see instance 1112)	Vacuum_column (see instance 1109)
2750	Vessel (see instance 1113)	Compartmented_vessel (see instance 1085)
2751	Vessel (see instance 1113)	Conical_separator (see instance 1088)
2752	Vessel (see instance 1113)	Hopper (see instance 1093)
2753	Vessel (see instance 1113)	Horizontal_vessel (see instance 1094)
2754	Vessel (see instance 1113)	Pressure_vessel (see instance 1101)

Table M.41 – Specified instances of Classification_of_class_of_material (continued)

inst.	classifier (broader class)	classified (narrower class)
2755	Vessel (see instance 1113)	Refractory_lined_vessel (see instance 1105)
2756	Vessel (see instance 1113)	Spherical_vessel (see instance 1107)
2757	Vessel (see instance 1113)	Tank (see instance 1108)
2758	Vessel (see instance 1113)	Vacuum_vessel (see instance 1111)
2759	Vessel (see instance 1113)	Vertical_vessel (see instance 1112)
2760	Vessel_head (see instance 1152)	Conical_head (see instance 1134)
2761	Vessel_head (see instance 1152)	Dished_head (see instance 1141)
2762	Vessel_head (see instance 1152)	Ellipsoidal_head (see instance 1147)
2763	Vessel_head (see instance 1152)	Flat_head (see instance 1149)
2764	Vessel_head (see instance 1152)	Hemispherical_head (see instance 1153)
2765	Vessel_head (see instance 1152)	Torispherical_head (see instance 1192)
2766	Vessel_head (see instance 1152)	Vessel_bottom (see instance 1199)
2767	Vessel_internal (see instance 1203)	Baffle (see instance 585)
2768	Vessel_internal (see instance 1203)	Bolted_internal (see instance 1124)
2769	Vessel_internal (see instance 1203)	Demister (see instance 1137)
2770	Vessel_internal (see instance 1203)	Dip_pipe (see instance 1139)
2771	Vessel_internal (see instance 1203)	Downcomer (see instance 1145)
2772	Vessel_internal (see instance 1203)	Inlet_internal (see instance 1154)
2773	Vessel_internal (see instance 1203)	Loose_internal (see instance 1163)
2774	Vessel_internal (see instance 1203)	Plate_settler (see instance 1173)
2775	Vessel_internal (see instance 1203)	Refractory_lining (see instance 1177)
2776	Vessel_internal (see instance 1203)	Support_tray (see instance 1190)
2777	Vessel_internal (see instance 1203)	Tray (see instance 1194)
2778	Vessel_internal (see instance 1203)	Tray_valve (see instance 1195)
2779	Vessel_internal (see instance 1203)	Vessel_packing (see instance 1204)
2780	Vessel_internal (see instance 1203)	Vortex_breaker (see instance 1206)
2781	Vessel_internal (see instance 1203)	Welded_internal (see instance 1207)
2782	Vessel_packing (see instance 1204)	Berl_saddle (see instance 1122)

Table M.41 – Specified instances of Classification_of_class_of_material (concluded)

inst.	classifier (broader class)	classified (narrower class)
2783	Vessel_packing (see instance 1204)	Ceramic_balls (see instance 1129)
2784	Vessel_packing (see instance 1204)	Polypropylene_wool (see instance 1176)
2785	Vessel_packing (see instance 1204)	Structured_packing (see instance 1187)
2786	Vessel_packing (see instance 1204)	Unstructured_packing (see instance 1196)
2787	Vessel_internal (see instance 1203)	Reflux_spider (see instance 1166)
2788	Waste (see instance 1487)	Domestic_waste (see instance 1340)
2789	Waste (see instance 1487)	Emission (see instance 1342)
2790	Waste (see instance 1487)	Exhaust_gas (see instance 1347)
2791	Waste (see instance 1487)	Liquid_waste (see instance 1388)
2792	Waste (see instance 1487)	Oil_spill (see instance 1421)
2793	Waste (see instance 1487)	Solid_waste (see instance 1460)
2794	Water (see instance 1488)	Ice (see instance 1374)
2795	Water (see instance 1488)	Produced_well_water (see instance 1441)
2796	Water (see instance 1488)	Steam (see instance 1468)
2797	Wax (see instance 1489)	Ceresin (see instance 1324)
2798	Wax (see instance 1489)	Micro_crystalline_wax (see instance 1398)
2799	Wax (see instance 1489)	Mineral_wax (see instance 1401)
2800	Wax (see instance 1489)	Paraffin_scale (see instance 1425)
2801	Wax (see instance 1489)	Paraffin_wax (see instance 1426)
2802	Wax (see instance 1489)	Petrolatum (see instance 1432)
2803	Wax (see instance 1489)	Slack_wax (see instance 1457)
2804	Wear_ring (see instance 1009)	Casing_wear_ring (see instance 871)
2805	Wear_ring (see instance 1009)	Impeller_wear_ring (see instance 921)
2806	Wedge_gate_valve (see instance 1064)	Expanding_wedge_gate_valve (see instance 1026)
2807	Wedge_gate_valve (see instance 1064)	Soft_seated_wedge_gate (see instance 1055)
2808	Wedge_gate_valve (see instance 1064)	Solid_wedge_gate_valve (see instance 1057)
2809	Wedge_gate_valve (see instance 1064)	Split_wedge_gate_valve (see instance 1058)

Annex N
(informative)

Specified instance listing

This annex provides a listing of the instances of class specified in annex M of this part of ISO 10303. The listing contains both the keywords and the text definitions.

The listing is available in two formats, as follows:

ISO 10303: The listing is in the form of a ISO 10303-21 file according to the AIM schema of this part of ISO 10303 and conformance class 4.

The standard instances of class are recorded on the file as if they were user defined instances of class, as follows:

- the **name** of each class is the keyword specified in annex M; and
- the **description** of each class is the definition specified in annex M.

ISO 13584: This listing is in the form of an ISO 10303-21 file according to the Dictionary Schema of ISO 13584-42.

The standard instances of class are recorded on the file as dictionary elements, as follows:

- the **code** of each **Class_BSU** is the keyword specified in annex M; and
- the **definition** of each **Class** is the definition specified in annex M.

This annex is provided in digital form on a 1.44 MB DOS formatted disc included with this part of ISO 10303. The files are named ST_10303 and ST_13584. They are in ASCII character format.

The disc specified in this annex is not included in the CD ballot package, because it is merely a presentation of the content of annex M in formats which are more convenient for computer software. The disc is readable only by implementations of this part of ISO 10303 or of ISO 13584.

The disc specified in this annex will be included in the DIS ballot package.

Annex P
(informative)

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